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No. 1—Causes of Deaths Among Calves in Dairy Herds*

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The equilibrium between health and disease in young stock is more delicately balanced than in older animals. A bacterial parasite not necessarily pathogenic in adults may cause disease and death in young animals because of the instability of their metabolism. The normal relationship existing between domesticated animals and their environment, which is so easily upset in young stock, may be disturbed by faulty nutrition, by unhygienic housing or by exposure to some infection. The disease may be due finally to parasites, but, as the primary cause is often not parasitic, then the cure and prevention of such diseases should consist in the restoration of the normal ecological relationship between animals and their environment. Furthermore, the study of any disease should include consideration of all the factors involved and its prevention may be comparatively simple when all these are understood. With this in mind, a brief account is given of the more important diseases of calves in this country.

COLIBACILLOSIS OR "WHITE SCOURS"

This disease occurs in calves during their first week or so of life and is a frequent cause of death. It is recognised that in most cases it is due to *Bact. coli* which frequently invades the blood stream and produces a septicaemia. There is some evidence that special races of *Bact. coli* exist (Lovell, 1937) and that these are more virulent than the normal strains. That delicate balance which exists between the normal bacterial flora and the resistance of the young calf is easily upset in those born in a weakly condition. In a herd or area in which some calves are below normal these special races of *Bact. coli* are enabled to develop and to become established, but they make no headway in stronger animals. Errors in feeding may also act as a predisposing cause. That the digestive tract of a calf may be easily disturbed by over-feeding is very definitely expressed by Hewison (1939) in a recent article on calf rearing. The relevant extract is as follows: "I consider that much trouble and sometimes total loss is incurred by over-feeding the calf during the first fortnight of its life. A calf, if reared in the natural way, will take its food from the cow in small quantities. In rearing a calf 'on the bucket,' large quantities of milk or milk substitute fed in the early stages will quickly upset a calf's stomach. It is well to bear this in mind, and to dilute the milk or milk substitute for the first few days." The same point of view is expressed by Sheehy (1934) who found that a large number of cases of digestive disturbance in calves could be traced to abnormal curd formation in the fourth stomach; this resists digestive action and is ultimately a cause of death. He is of the opinion that such a condition should be called "nutritional white scours" and a simple method of treatment consists in withholding all milk and giving water solely for a day, followed by much-diluted milk for a few days. Another important point in the nutrition of the young calf concerns the supply of an adequate amount of colostrum as soon after birth as possible (Smith and Little, 1922). Delay in obtaining it, or the lack of it, allows normal intestinal bacteria to invade the body and produce disease. Not only does colostrum exert some protective power but so also does serum obtained either from the mother or from a cow in the same herd. The feeding of serum, though only partially successful, appears to be better than injecting it but a combination of both methods is superior to either alone (Smith and Little, 1922). There are differences of opinion as to how colostrum exerts its action, whether by conferring a passive immunity on the calf or by its vitamin A content. It is known, generally speaking, that colostrum contains a higher antibody content than serum and that antibodies appear in the blood of calves which receive colostrum. Furthermore,

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these antibodies which the new-born animal acquires are associated with the direct absorption of the globulins of colostrum. This absorption is a process which is independent of the presence or absence of antibodies. (Orcutt and Howe, 1922.) The rate of absorption is fairly rapid for it is known that agglutinins for *Br. abortus* appear in the blood of calves slightly over an hour after the calf has ingested colostrum containing such antibodies (Little and Orcutt, 1922), and that the maximum concentration is reached in about five hours. Smith (1930) showed that the colostrum of normal cows usually contains antibodies for *Bact. coli* "of the scours type." This protective action of the colostrum—as tested in guinea-pigs—was low in some instances and in those cases the cows had only come into the herd shortly before calving. The inference is that they had not been in contact long enough to have been immunized to the new bacterial flora of that herd. Assuming, therefore, that adult cows in an area or a herd in which colibacillosis occurs have been naturally immunized to the particular strain or strains of *Bact. coli* concerned, then antibodies to that strain or strains are present in high concentration in the colostrum. On the other hand, Jordan (1933) thought that the heavier mortality in spring calves than in autumn calves may be associated with the winter pregnancy of the mothers during which they would be stall-fed rather than at pasture. Should the vitamin-A content of colostrum be of primary significance then it might well be that the suggestion of Stewart and McCallum (1938*a*) of allowing cows a non-lactating period of three months will help to reduce the mortality in calves. They found that the vitamin-A content of colostrum is subject to great variation and the higher content was found in cows which had a longer non-lactating period between calvings. This should be expected when the vitamin-A content in the colostrum is assumed to be dependent upon the liver reserves. A further report by Stewart and McCallum (1938*b*) has a more direct bearing on the association of calf mortality—especially from white scours—and the vitamin-A content of the colostrum of the mothers. The investigation concerned a total of 206 calves of which 150 were born of cows with more than 250 Blue units of vitamin A per 100 ml. of colostrum and 56 calves were from cows whose colostrum contained less than that amount. Of the 150 calves, twelve died (8 per cent.), 14 suffered from white scours (9·3 per cent.), and one died from this disease (0·66 per cent.). Of the 56 calves whose mothers contained a lower amount of vitamin A in the colostrum, 13 died (23·2 per cent.), 15 suffered from white scours (26·8 per cent.), and nine died from this disease (16 per cent.). The numbers are small but the figures given are suggestive of the importance of vitamin A in the colostrum. The feeding of a diet rich in this substance, or the lengthening of non-lactating periods during successive calvings, may help to reduce the mortality from white scours. Cramer and Kingsbury (1924) consider that a deficiency in vitamin A does not affect appreciably the general defence mechanisms of the body but may impair the efficiency of the local tissue defences. There is the classical example of xerophthalmia which is due to a vitamin-A deficiency but in its later stages is associated with a sub-acute bacterial infection. Cramer (1923) has described changes in the intestines of rats which had been fed on a vitamin-A deficient diet. In his experimental animals, the intestinal bacteria were present in larger numbers than in his controls and were often adherent to the villi, whereas in normal rats the bacteria are confined to the lumen of the intestine. Furthermore, in the avitaminotic rats, intestinal bacteria invaded the mucous glands and were filling the lumen of the glands in dense masses. He considers that such a state affords the intestinal bacteria ready access to the tissues and blood stream. Whatever the virtue of colostrum—antibody content or vitamin A—the intestine of the newly born calf is permeable to proteins, *e.g.*, the globulins, during the first day or so of its life only and a delay in obtaining colostrum may be as disastrous as its absence.

It appears then that colibacillosis is the result of the shifting of an equilibrium in favour of the *Bact. coli* which are normally present in the digestive tract. This shift may be determined by defects in the digestive tract, by a delay in feeding which eventually leads to over-distension and the formation of undigested coagulable protein in the stomach, by the withholding of colostrum or by the presence in the area of a particular virulent strain of *Bact. coli*. The immediate reactions are a great increase in the number of *Bact. coli* which often results in a septicaemia and death. The frequent occurrence of this phenomenon in a herd would tend to establish the pathogenicity of one particular race of *Bact. coli* which would dominate the bacteriology of the herd. As the special races of *Bact. coli* may vary from herd to herd or from area to area, it appears useless at the moment to consider any form of mass immunization. These bacteria produce disease by substances intimately bound up with the bacterial bodies and immunization with one type would not afford protection against another. The shifting of the balance in favour of the calf therefore depends much more on the methods of animal husbandry than on anything else. The balance may, however, be incompletely shifted for a focal interstitial

nephritis may follow the localisation of *Bact. coli* in the kidneys after partial resistance to infection (Smith, 1925).

A comparable disease to white scours exists in children, and Bessau (1933) has pointed out the dangers of feeding children with milk containing *Bact. coli* even though the milk may not have become sour. Human milk may be contaminated with *Bact. coli.* Bessau stresses the importance of extraneous pathogenic strains being available, for all strains are not injurious and a child may suffer no harm from eating its own faeces containing *Bact. coli.* In addition to the importance of these so-called "dyspepsia coli," it is pointed out that the resistance of a child to such infection may be lowered, for example, by a bath which is too hot.

Salmonella Infections.

Two members of the Salmonella group have been incriminated in diseases of calves, namely, *S. typhi-murium* and *S. enteritidis* var. *dublin.* The latter is by far the commoner and Smith and Scott (1930) showed that six strains of bacteria isolated from calf dysentery in Denmark and hitherto known as "paracolon" bacilli were the *dublin* type of Salmonella. This organism is also responsible for cases of gastro-enteritis and continued fever with septicaemia in man. Its normal habitat is probably the bovine animal for it is recognised as a cause of disease in calves in America, Kenya, South Africa, Germany, India and in Great Britain. One outbreak dealt with in this country by Bosworth and Lovell (1931) concerned 20 calves of which 18 died and a characteristic symptom was the offensive diarrhoea—sometimes blood-stained—with some abdominal pain. Some calves develop pneumonia and some show signs of septicaemia (Shirlaw, 1937). It would not appear to be a common infection in this country but it is of some public health importance because of the pathogenicity of the bacillus for man. Recently there was an outbreak of food-poisoning in about 100 children due to this organism and the infection was traced to a "carrier cow" (Conybeare and Thornton, 1938). The other Salmonella—*S. typhi-murium*—is a widespread member of this group and has been recovered from occasional cases of disease in calves both in this country and elsewhere. It is also a human pathogen and causes gastro-enteritis or food poisoning. Calves affected with either organism are usually older than those with white scours.

Corynebacterium Pyogenes Infections

C. pyogenes is a widespread pathogen associated with suppurative conditions in bovines, pigs, sheep and goats and is a frequent cause of pneumonia in calves. Of 100 calves examined shortly after death by Lovell and Hughes (1935), twelve cases of disease were due to *C. pyogenes* and the organism was implicated in five more. Smith (1921, 1925) was of the opinion that in some cases this organism continues a disease process by multiplying in tissue which is already infected with some other agent such as *Actinobacillus actinoides* or *Brucella abortus.* Calves of almost any age are apparently liable to infection and the *post-mortem* findings are quite uniform. There is usually a consolidation of the lungs with areas of necrosis and suppuration often associated with a fibrinous pleurisy with adhesions and enlarged and haemorrhagic mediastinal glands. The suppurative areas sometimes soften and form a cavity containing greenish semi-fluid pus. *C. pyogenes* forms a filterable toxin which can be converted into a toxoid by the addition of formalin (Lovell, 1937), and, although it is not known yet whether the toxin plays the main part of the pathogenic activities of the organism, certain work as yet unpublished indicates its responsibility for the systemic disturbances in such infections. There is, therefore, hope that this condition may be controlled by some form of immunization since trials which are being made at the moment show that injections of an alum-precipitated toxoid stimulate the formation of antitoxin in the blood serum of animals. There is another question which arises concerning this disease, namely, as to whether it is imported into a herd or whether it is a latent infection which may arise under the influence of some other agency. The latter view is gaining ground because of the appearance of complications due to *C. pyogenes* after a debilitating disease such as foot-and-mouth disease (Weinberg *et al.*, 1938), and the presence of *C. pyogenes* antitoxin in the sera of normal animals. The significance of this latter phenomenon is that, whereas there is little or no such antitoxin in the sera of horses, man, dogs and monkeys, there are larger amounts in bovines, sheep, pigs and goats and an increasing concentration with increasing age (Lovell, 1939). This antitoxin is due probably to the latent infection of these animals with *C. pyogenes,* and bovines, sheep, pigs and goats are species frequently infected and, furthermore, *C. pyogenes* has been recovered from the mouth, nose and vagina of normal cattle (Ochi and Zaizen, 1936). *C. pyogenes* infections should be regarded as endogenous in their development and, as a part at least of the pathogenesis is due to a toxin, there is some hope that active immunization with a toxoid may have beneficial effects in controlling calf pneumonia due to this bacillus.

Pneumonia due to a "Haemolytic Cocco-Bacillus"

In 1921 Jones and Little described an outbreak of pneumonia in dairy cows and calves

due to *Bacillus bovisepticus*, and the strains isolated were classified by Jones (1921) into three groups. Whilst there is little doubt that group 3 and possibly group 2 are pasteurella, group 1 is a haemolytic cocco-bacillus which has very little pathogenicity for laboratory animals and on cultural and other grounds cannot be accepted as a Pasteurella. It is referred to by Tweed and Edington (1930) as *Pasteurella boviseptica* (Jones, group 1) and by Lovell and Hughes (1935) as a "haemolytic cocco-bacillus." It is apparently similar to that isolated from sheep by Montgomerie *et al.* (1938). In calves dead from infection with this organism the lesions are confined to the respiratory tract, the lungs being deeply congested and the consolidation is lobular in distribution. On squeezing a piece of lung tissue, pus can often be expressed from the bronchioles but there is an absence of those areas of suppuration with cavity formation so commonly found in infections with *C. pyogenes*. The American workers showed that the disease followed the introduction into the herd of a carrier and, although some calves developed pneumonia, in others there was a rhinitis from which the organism could be obtained. A characteristic rhinitis could be reproduced by brushing the nasal mucosa of calves with a swab dipped in culture. Calves which suffered from the spontaneous disease may continue to carry the organism in the nasal passages for as long as 121 days. It is suggested that strong, healthy calves may resist the pneumonia and it is interesting to note that of the six calves which died from this infection (Lovell and Hughes) two were born prematurely and three were weak at birth. Tweed and Edington suggest that, in addition to the introduction of the disease into the herd, there are predisposing causes associated with transport by road or rail, whilst the period of the year may play some part as it is more prevalent during the winter months. There is no doubt that calves are more susceptible to this disease than adults, and it is important to note that the infection is often epidemic in character which points to the introduction of the infection as being the most important factor in this disease, the weakly ones suffering from pneumonia and the stronger ones from a rhinitis. It is probable that the outbreak of bovine pasteurellosis described by Turner and Holmes (1938) was of this kind. Of 212 cattle at risk, ten calves and ten heifers died.

There has—as yet—been insufficient work to express an opinion as to a possibility of there being available any form of specific prophylaxis. The important points concerning the introduction of the disease into a herd and the probable predisposing factors should help in formulating some effective methods of control.

Pneumonia due to "Pasteurella Septica"

There is little doubt that occasional cases of pneumonia in calves occur in this country due to *Pasteurella septica*. This organism is widespread in its pathogenicity and is the cause of fowl cholera, haemorrhagic septicaemia and other similar conditions. It is not known, however, with any degree of certainty whether the organism which causes an outbreak of disease in one species of animal initiates an outbreak in another species. It was thought by Mettam (1903) that "white scours" in calves was due to a Pasteurella because it had been isolated from diseased calves in Ireland. The findings of Mettam were adversely criticised in an editorial article in the *Journal of Comparative Pathology and Therapeutics* in 1903, but only in so far as the view expressed that Pasteurella was the cause of "white scours." Actually *Pasteurella septica* has been isolated from sporadic cases of pneumonia in calves in Great Britain and in addition to the pneumonia there is usually a marked pericarditis. Whilst it is suggested that carriers of Pasteurella are more common than is usually considered to be the case, there is little doubt that the actual disease process is in part produced by some other factor which is probably not parasitic.

Helminth Infections

Several helminth parasites may cause disease in calves some of which are concerned with disturbance of the digestive tract. Species of the genus *Trichostrongylus* may produce symptoms in calves; they are less pathogenic for adult cattle. *Ostertagia ostertagi* is a cause of anaemia, general weakness and death in animals, including calves, and it is significant that poorly fed and young animals are more susceptible than others. This parasite produces its main lesion in the abomasum and is difficult to eliminate by means of drugs. Another parasite, namely, *Cooperia oncophora*, may affect calves severely and the symptoms and lesions are similar to those of trichostrongylosis but anaemia is more marked, the worms penetrating the mucosa of the small intestine to suck blood. Infection is frequently acquired on moist pastures. *Haemonchus contortus* may, by its presence in the abomasum, also produce anaemia and death of calves in which there may be diarrhoea or constipation. The eggs of *Trichostrongylus*, *Ostertagia*, *Cooperia* and *Haemonchus* are so very much alike that it is extremely difficult, or even impossible, to distinguish them in faecal examinations. One can, by cultural methods, cause the eggs of these parasites to hatch and ultimately produce third-stage infective larvae. Such larvae may be distinguished as belonging to one or another of the genera mentioned but specialist knowledge is necessary for diagnosis by these methods. A

definite diagnosis is, however, possible by a *post-mortem* examination at which one may obtain the adult roundworms and so identify them.

The well-known disease in calves known as "Husk" or "Hoose" is caused by a cosmopolitan helminth, *Dictyocaulus viviparus* and, although the animals have the characteristic cough and suffer from dyspnoea, there are other symptoms of anaemia, emaciation and maybe diarrhoea. Intratracheal injections are given with varying degrees of success but good feeding and shelter are more important and animals should be protected by their removal from infected ground to dry pastures with a supply of clean drinking water. As far as possible, moist pastures must be avoided; dry ones are fairly safe.

Other Diseases

There are other diseases which occur either rarely or not at all in this country. Hydrocyanic acid poisoning sometimes occurs in older calves fed on linseed cake some samples of which, when macerated with merely warm water, yield sufficient hydrocyanic acid to kill animals receiving it. Hot water destroys the enzyme responsible for liberating the acid. Several cases of this kind have been met with in calves of four to five months old, in which death was sudden and there were blood-stained pleural and peritoneal exudates.

Calf diphtheria caused by *Fusiformis necrophorus* is a serious though comparatively rare disease in this country. It is readily diagnosed by the necrotic changes in the mouth and pharynx and occurs in badly ventilated and ill-kept sheds.

A condition known as "winter dysentery" or "black scours" has been described in calves and cattle in America by Jones and Little (1931) and Jones, Orcutt and Little (1931). It is due to a vibrio—*Vibrio jejuni*—but it has not so far been reported in this country.

Coccidiosis, although a cause of dysentery in adult bovines, is apparently rarely responsible for disease in calves.

General Incidence of Calf Diseases

There is little exact information available as to how serious is the loss occasioned by disease and death in calves and an attempt has been made to assess it. A survey was carried out during the years 1936 and 1937 involving the collection of data from over 300 farms and covering more than 10,000 cows in England and Wales. Although the records have not been analysed sufficiently to give actual figures, the mortality among all calves born alive is somewhere in the region of 5 or 6 per cent. It should, however, be made clear that the mortality varies above and below this in different areas and that the information has been derived mostly from farmers belonging to milk-recording societies. A reasonably high level of farm management and animal husbandry would be expected from a selected class such as this. A survey carried out in Ayrshire in 1931-32 by Jordan showed that, of 548 calves born on 26 farms during 1931, 113 or 20 per cent. died. The greater number of deaths were in the spring with a mortality of 26 per cent. compared with 8 per cent. in the autumn. A high death rate also occurred in the spring of 1932, namely, 24 per cent. The marked difference between the spring and autumn figures was assumed by him to be related in some way to the diet of the cows during pregnancy, and this question has been referred to in the discussion on "white scours." There are records of 69 deaths amongst 213 calves in Ireland in 1903. (Editorial, 1903.) In spite of these relatively high figures, there is a great difference between them and those of Jensen (1893) who reported, on information supplied by a State consultant in Denmark, that in the year 1885-86 122 of 211 calves died from "white scours" and in the following year 142 of 189 died.

The age incidence is significant in any set of figures, and the first week of life appears to be the most critical period. Amongst the 100 calves examined *post-mortem* by Lovell and Hughes (1935), 25 were less than seven days old and 28 from seven to 14 days old and, of the 37 which died from colibacillosis, 22 were less than seven days old and eleven from seven to 14 days old. From a survey of the literature there seems to be little doubt that colibacillosis or "white scours" is the most serious condition in calves, and those affected are usually only a few days old. It is difficult to say which is the next important disease but pneumonia due to either *C. pyogenes* or the "haemolytic coccobacillus" alone or together appears to take second place. Conditions due to Salmonella, Pasteurella, helminthic infestations and accidents are of less importance.

Summary

The following diseases of calves are discussed:—

(1) *Colibacillosis* or *white scours*, which is the result of a combination of factors and due ultimately to invasion by *Bact. coli* or some other common organism. The importance of the methods employed in calf rearing is pointed out and special reference is made to the part played by colostrum in its control.

(2) *Salmonella infection* of calves is due largely to *S. enteritidis* **var.** *dublin* and the disease is of importance because the causal organism is pathogenic for man.

(3) *Corynebacterium pyogenes* may be the cause of a suppurative pneumonia in calves.

The view is expressed that *C. pyogenes* infections are endogenous in their development and that some control may be exercised over the systemic disturbances by immunization with a toxoid.

(4) A "haemolytic cocco-bacillus," erroneously called a Pasteurella, causes pneumonia in weak calves and a rhinitis in older ones. It is often associated with transport by rail or road and sometimes follows the introduction of a fresh animal into a herd.

(5) Pneumonia due to *Pasteurella septica* is rare in this country but sporadic cases occur.

(6) Diseases due to helminth parasites are mentioned, a common parasite being *Dictyocaulus viviparus*, the cause of "husk."

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Addendum.

Since the preparation of this paper an article has appeared (Lamont, H. G., and Kerr, W. R. (1939), *Vet. Record.* **51.** 672) entitled "Infectious Pneumonia of Calves or Calf Influenzal Pneumonia. A Preliminary Note." There is a record of some preliminary experiments and the authors state that "the work that has been done indicates that calf pneumonia or calf influenzal pneumonia is infectious" and that "it is likely that the exciting cause is a virus."

. . . . .

The foregoing paper was the first to be presented to and discussed by Congress. Following the Civic Reception and the opening of the Exhibition on Monday, July 24th, the members returned to the Conference Hall in large numbers for the consideration of Dr. Lovell's contribution, "Causes of Deaths among Calves in Dairy Herds."

The Chairman, Mr. T. J. Bosworth, M.A., B.Sc., M.R.C.V.S., D.V.S.M., having announced the subject for discussion, called upon Mr. Gould as the first of the openers of the discussion.

Mr. G. N. Gould, Jun., M.R.C.V.S. (Southampton): The study of calf diseases in the past has been the cause of considerable controversy and one finds current text-books remarkably deficient in information which can be applied practically to control these conditions which can and do at times assume endemic characteristics in dairy herds. It would appear that past investigation has been mainly concerned with the infective agent, and although at times theories have been advanced regarding hygienic conditions, navel infection and nutrition, the study of the diseases never appears to have been comprehensive.

Dr. Lovell's paper has gone a long way to repair that deficiency, but it is to be hoped that investigation will continue to enable points which may still be controversial and which require further investigation to be finally solved.

The incidence of calf diseases is most important in pedigree herds but with the inception of the attested herd scheme and the need for maintenance of self-contained herds, once tuberculosis has been eradicated as the most salient feature in the prevention of "breakdowns," successful calf rearing has become a much more important and vital problem to the dairy farmer and the profession.

Dr. Lovell points out that the study of disease should include all the factors involved and enumerates these as faulty nutrition, unhygienic housing and exposure to infection. If we are to apply this principle it is essential to appreciate in addition that the modern dairy cow and its progeny cannot be considered as animals in their natural state. The milk-producing propensity of the cow has been vastly increased from that sufficient to maintain its offspring. Lactation is usually well established at birth and even preceding birth and both the cow and the calf lead a sedentary life. Coli bacillosis is undoubtedly responsible for the highest mortality in young calves. Dr. Lovell quotes Hewison in regard to overfeeding of calves "on the bucket"; in my experience this overfeeding

is just as apt to occur "on the cow" in the absence of proper management. The calf when born will instinctively suck frequently if allowed so to do and the amount of milk available—easily available—is much greater than would be the case in the natural state; consequently, there is a marked tendency for the calf to take more than it can easily digest if no control is established.

Variance in the incidence of disease is well recognised. In my area I have not noted the seasonal variance. Heavy mortality was a predominant feature of the condition, until the adoption of routine measures of control and treatment some years ago based on the work of W. L. Williams, whose conclusions—which appear to have been drawn mainly from clinical observation—coincide remarkably with the information based on laboratory examination and research carried out by Dr. Lovell. He points out, amongst other things, that the feeding of more milk than can or will be easily digested is a peril to the life of the young calf. Dr. Lovell hints that the control of calf diseases in all forms is essentially a question of farm management: with this I am in complete agreement. The intelligent co-operation of attendants, therefore, must be obtained.

There is, I find, a great tendency for these conditions to merge into one another: pneumonia is a frequent complication or sequel of scour not associated with death from septicaemia.

It would appear that the calf has potentially pathogenic *Bact. coli* in the intestine derived at or immediately after birth from the uterine or vaginal discharges or from its surroundings. In my experience the greatest incidence occurs in those herds widely infected with contagious abortion. Does this agree with Dr. Lovell's experience?

The development of special races is, I presume, explained by animal passage inducing vastly increased virulence. In this connection I have one herd in which the introduction of a new in-calf animal or of a calf is inevitably followed by white scour in the calf, although disinfectant precautions are rigidly carried out. Calves bred from cows on the premises are not troubled to any great extent. This would appear to support the theory of the value of the antibodies derived from the colostrum. I have another herd in which *Salmonella enteritidis* infection was very prevalent some years ago and in which the owner was advised to wean his calves at birth on to pasteurised milk with the addition of cod liver oil as a means of control. This was followed by most successful results and in consequence the policy was not interfered with. In the last six months, however, white scour became very prevalent and troublesome. In addition a number of calves developed rickets. It was found, on investigation, that a cheap cod liver oil had been utilised over that period—the vitamin content of which appeared to be nil. The introduction of biologically assayed cod liver oil brought the scour condition under control in a very short time. It would appear that on this farm vitamin A is the main influence for good.

Dr. Lovell states that it is an important point that calves should receive an adequate amount of colostrum as soon after birth as possible. Can he indicate what he considers is the best time and what is an adequate amount?

The evidence that colostrum contains protective antibodies is indisputable and it is very interesting to hear that the intestine of newly born calves is permeable to proteins such as globulins with whose direct absorption the antibodies are associated during the first day or two of life only. The statistics given regarding vitamin A are very significant and there can be little doubt that it plays an important part in the healthy development of the calf. I understand that the function of vitamin A is that it helps to preserve the physiological integrity of various epithelial structures, particularly of the intestine, the air passages and the urogenital system, and thus maintains the first line of defence against the invasion of bacteria. It is therefore of importance in all these calf diseases.

Is there any evidence of direct bactericidal action of vitamin A? Is the calf born with any store of vitamin A in the liver and is there any limit of capacity to store vitamin A?

Deficiencies of any sort tend to decrease the ability of the body to resist disease and I find calf diseases much less prevalent in dairy herds in which a mineral addition of bone flour is added to the diet than in those not receiving it.

Has Dr. Lovell knowledge of any practical method of artificially feeding the cow which will tend to maintain vitamin A on a high level? I mention this because I have experience in a number of herds in which the cows have been milked right through, being allowed no dry period, as a step in the control of streptococcic mastitis, and I found on investigation that there was no increased incidence of coli bacillary or other calf diseases, the herds being practically trouble-free. In all concerned the balanced ration utilised contained 40 per cent. flaked maize which I understand is a useful source of vitamin A.

It would appear obvious that an addition of cod liver oil to the diet of in-calf cows would be a useful source of vitamin A. Has Dr. Lovell any experience of its use? I ask this because about eight to ten years ago in mineral feeding experiments on cows in milk I fed cod liver oil in a herd hoping for better results. The experiment had to be dropped because there was a fall in the butter-fat content of the milk which was

not obviated until the feeding of the cod liver oil was stopped. I have often wondered whether this was coincidence or whether any explanation exists.

There is, in my experience, a distinct relationship between the incidence of healthy pregnancy, prompt delivery and the incidence of white scour.

The allocation of a long dry period, say three months, for the modern dairy cow would be extremely difficult or impossible in high-yielding herds. It would seem obvious that the maintenance of the highest degree of resistance possible is the chief feature. The method I have used in the past has been strictly to ration the calves from birth to avoid over-feeding, to provide light, airy and, more particularly, dry quarters for the calves free from undue draughts, the prompt isolation of any calves born in a weakly condition and any calves showing signs of scour.

In herds which have been badly infected the disease has responded to this control; but one of my recommendations differs greatly from Dr. Lovell's advice. He states that a young calf should receive an adequate amount of colostrum as soon after birth as possible, and that delay in feeding eventually leads to over-distension. Does he mean by feeding or from flatulence? I have followed Williams' advice repeatedly and withheld feeding for 24 hours, following this with rationed amounts of colostrum and subsequently milk. I have, however, allowed the administration of water during the first day, a practice quite common in human midwifery. In the case of weakly calves glucose has been added to this water. The calf does not appear to show undue hunger and the results have been beneficial.

My experience of the value of calf scour serum in treatment coincides with Dr. Lovell's.

The use of injections of maternal blood has occasionally been followed by apparently beneficial results associated with other measures of treatment. The treatment adopted which has been most successful has been the withholding of all food for 24 to 36 hours. At the end of that time the calf is given a pint of cold water followed in an hour by a pint of milk and a pint of water. This is continued at intervals of six hours for three days following which the concentration of milk is gradually increased until whole milk is being given in seven to ten days.

The calves are kept warm and dry and for those in a very weak condition glucose is added to the water. Medicinal agents I have found of little, if any, value.

In regard to Salmonella infection, in one experience of this condition it was ultimately traced to a carrier cow used for calf rearing, three calves suckled on which developed the condition in succession. Mortality in the outbreak was very high. The elimination of the carrier cow, disinfectant precautions and routine treatment for scour resulted in clearing up the condition.

The pneumonic conditions to which calves are subject have, for the main part, in my experience, been the sequel of white scour. Clinical differentiation of the different types other than the haemolytic cocco-bacillus type would appear to be impossible pending *post-mortem* examination.

I had one experience of the haemolytic cocco-bacillary infection. It was not associated with high mortality. The best treatment was found to be the removal of animals from the buildings, placing in an open straw yard and giving general attention to nursing, feeding and disinfection. In the particular instance concerned the introduction of the disease was associated with the purchase of a bull calf which came on a long rail journey. The bull calf itself developed no sign of illness. There was no proof that this calf brought in the disease. The majority of the calves which developed the symptoms described by Dr. Lovell also had scour. The owner noticed that the condition followed closely on a long period of difficulty in breeding in the cows; no connection, however, has been established.

In conclusion may I take this opportunity of congratulating Dr. Lovell on his paper which I am sure will be accepted as a valuable contribution to our knowledge of these diseases.

The second opener of the discussion was Mr. P. R. Turner, M.R.C.V.S., of Bury St. Edmunds, whose contribution was as follows:—

I must first of all congratulate Dr. Lovell on this paper, but I must say that, had I at the time of officially accepting to be a speaker, realised the true significance of the title of this paper, which confines itself to causes of deaths, I do not think that I should have accepted so readily.

I must confess my knowledge of bacteriology in its up-to-date form is not one of my strong points and as the author refers only very briefly to any treatment my scope is very limited.

The importance of all aspects of this subject must be realised when we read of the high mortality figures given towards the end of the paper. The hygienic and dietetic aspects are most important. A common cause of the incidence and spread of the first condition, that is, white scour, is exposure of very young calves, huddled together in open pens, at markets. Some of these calves may be only a few hours old, having often been deprived of the normal amount of colostrum, the virtues of which have been so ably referred to in the paper. As the result of this they become easy victims and act as a portable incubator and disseminator of infection for quite a time. Regarding the

dietetic aspect I am sure that much harm is occasioned by the injudicious upsetting of a balanced ration. This is often done by the owners with a view to getting their calves on quickly. I have met cases where young calves were being pail-fed on new milk. Through misdirected assiduity the owner has added to this milk indefinite quantities of some form of calf meal, designed when used according to directions to be a balanced ration. The temperature of the milk, which is fed by the pail method, is also of great importance; it should, of course, be as near to body heat as possible. I will leave this dietetic point now because it will undoubtedly be dealt with in Dr. Green's paper on Thursday.

I should like, before leaving the discussion on white scour, to ask the author if he can explain how it could be that both vaccine and medicinal treatment failed in an outbreak of white scour under my observation but responded immediately to treatment by lamb dysentery serum. I notice that one probably important channel of infection, namely, the navel, was not mentioned. Referring to *Corynebacterium pyogenes* as causing pneumonia in calves, etc., I believe this organism is often associated with mastitis. Does the author think that calves may become affected through the medium of a cow's udder, affected in any degree with mastitis in which this organism is implicated?

There are other points which I should have liked to have raised but feel that I must take up no more time as I must refer to a remark concerning my thesis on bovine pasteurellosis and say that I am still convinced that the condition to which I referred is due to a Pasteurella because a bi-polar organism conforming to all the characteristics of a Pasteurella was isolated from the bone marrow at a laboratory and my conviction is strengthened by a reference to Gaiger and Davies, particularly as far as they describe the macroscopic *post-mortem* findings.

Mr. Donald Campbell, M.R.C.V.S., of Rutherglen, who also "opened," said: The present is an opportune time to discuss at a "National" Congress those conditions which form the subject of Dr. Lovell's admirable paper. With the spread of tuberculin testing, an increasing number of stock-owners, who formerly sold their calves, are now rearing them, and calf diseases, which were always important, are of a wider interest than ever before. When one reads that mortality in calves up to ten days old may be over 25 per cent., and is in any case always alarmingly high, the seriousness of the problem becomes very evident. Good work has recently been done to put opinions on calf diseases on a sound scientific basis, and that first of all is what is needed. For too long white scour and its kindred affections have been the domain of the quack and the nostrum vendor, but that is inevitable while our knowledge remains sketchy and our practice little better than empiric. In presenting to Congress so clearly and succinctly an outline of the latest investigations our author has performed a valuable service.

I do not propose to discuss all the conditions mentioned, for some of them I encounter so rarely that I read about them with interest rather than speak about them with authority.

In regard to white scour Dr. Lovell, as I understand his paper, refers in somewhat non-committal fashion to two types of the disease, one due to invasion of a weakly system by the normal intestinal bacteria, and the other due to invasion by specially virulent strains of bacteria in an animal which might have resisted the normal inhabitants of the bowel. That appears to me to be very reasonable. The position is complicated, however, by some evidence that bacteria which are normal in some herds may become pathogenic when introduced into other herds or into animals from other herds. That, at any rate, is the inference drawn from tests in guinea-pigs. I wonder if it is any more than an inference. The work on which it is founded was recorded, as I read in Dr. Lovell's paper, in 1930, and it seems as if there should have been time since then to confirm it or otherwise by field investigations. Or is it already accepted as being established? If it is true, we have here an instance of the antibodies which are effective against one strain of bacteria being ineffective against a closely related strain. I am not sure how far that condition applies among other organisms, but I am sure it is not universal, although I suppose it may be fairly general in the coli group. In consideration of all this Dr. Lovell concludes that attempts at immunisation by mass-produced biological preparations have at present no chance of wide success. I heartily agree with him in this. My experiences in the use of sera in white scour have been far from satisfactory, perhaps in part for the reasons suggested by Dr. Lovell.

Much prominence is rightly given to the work of Stewart and McCallum on the vitamin-A content of colostrum and its bearing on infections of calves. One immediately practical point arises out of that work. If it is the case that feeding with colostrum rich in vitamin A enables calves the better to resist disease, and that a long non-lactating period in the cow between calvings increases the amount of vitamin A in the colostrum, we have in the proposal of Stewart and McCallum that cows should be allowed a non-lactating interval of three months, a ready means of combating the white scour group of diseases.

Jordan has drawn attention to the heavy mortality among spring calves as compared with autumn calves, and general experience will

bear him out. No suggestion appears in the paper to account for that. Has any work been done to show whether or not the colostrum of autumn-calving cows contains more vitamin A than that of spring-calving cows? If vitamin A is as important in this respect as it would appear to be, here, I think, is a line of inquiry which should be followed. Stewart and McCallum certainly refer to this point, but only incidentally. If exact statistics are available, I should like to see them.

Reference is made to excessive formation of curd in the abomasum as a cause of so-called "nutritional white scour," and to treatment of this condition mainly by giving water to the affected calf instead of milk. In Scotland for some years past, probably in England also, but on that I cannot speak, a treatment of white scour that has found much favour among farmers has been the administration to the calf of lemon juice. An essential part of the treatment is the withholding of milk for two days, with water given instead, and mostly likely it is that, and not the virtue of the lemons, that constitutes the effectiveness that is claimed. I wonder at the same time if lemon juice has any action in breaking up curd. For many years I have been convinced that the most important detail in the treatment of white scour is the withholding of the milk. It does not appear to me that there is much immediate prospect of dealing successfully with white scour by means of sera, but recent striking developments in medicine encourage me to hope that before very long some chemical, rather than biological, product may be found, capable of bringing this disease under control.

In all discussions of calf diseases there is a tendency which I regret, to overlook the importance of joint-ill, by merely including it in the white scour group and making little or no further reference to it. For many reasons the grouping of co-related conditions is necessary for a proper understanding of them, but clinically surely the aim is more and yet more refinement in diagnosis and the recognition of separate and even minute distinguishing features. If the primary cause of two diseases is the same, but the characteristic symptoms are different, I maintain that the causes and significance of these different symptoms require careful study. So far as I have seen the special features of joint-ill in calves have been regarded merely as an aberrant manifestation of white scour infection, not important enough to claim particular study. Since I am assured by authorities that the primary cause of joint-ill is more or less the same as of white scour I must accept that, but I still press for investigation of the differences. One sees instances in which white scour and joint-ill appear to be part of the one outbreak, different forms of the one condition, but in other outbreaks white scour may appear without joint-ill or joint-ill without white scour. Merely to group them together in an easy generalisation is not enough. During this year, in my experience, reports from farmers about the prevalence of joint-ill among calves have been more numerous than ever before. It is a difficult condition to deal with, and its connection with infection of the navel is not always apparent. That is not to say that the connection does not exist. I believe it does, but the most seriously infected navel may present externally a deceptive appearance of innocence, while one that looks heavily contaminated may be comparatively innocuous. If I may be allowed to depart ever so little from strict adherence to the subject under discussion to-day, I should like to say that I deplore the advice so lavishly given, certainly not by Dr. Lovell, but elsewhere, about the care of the navel in newly born animals. In all ordinary circumstances, and considering the conditions into which animals are born, I am strongly of the opinion that the best treatment of navels is to leave them alone.

A few months ago I encountered a case of joint-ill in an Ayrshire heifer calf, between two and three weeks old, in which there was no history of scour. Both stifles and both hind fetlock joints were distended and the animal was recumbent. The umbilicus was certainly far from satisfactory, but apparently no worse than in many healthy calves. The owner agreed to let me have the calf alive for investigation and it was sent to Professor Emslie, of Glasgow Veterinary College, who had it slaughtered and made an immediate dissection, before *post-mortem* contamination had supervened. These, by the way, are the only circumstances in which I think the full value of a *post-mortem* examination is obtained. The lesions found by Professor Emslie were these:—

Umbilicus.—Patent and in a state of purulent inflammation; pus greenish-yellow.

Liver.—One abscess 2 to 3 cm. in diameter, with thin wall and greenish-yellow contents.

Both Stifle Joints and both Posterior Fetlocks.—Joint cavities filled with greenish-yellow pus which caused great distension of joint capsules. No alteration of articular cartilages.

All other Joints.—Increase of synovial fluid.

Left Retropharyngeal Lymphatic Gland.—Markedly enlarged and full of greenish-yellow, caseous pus.

Corynebacterium pyogenes was isolated from the lesions.

That case is, I think, not without interest in view of Dr. Lovell's paper, and particularly in view of his references to *Corynebacterium pyogenes.* Apparently this organism is inculpated in many conditions, especially pneumonia, but there is no reference to a condition such as I have described. If the organism is a

frequent cause of joint-ill perhaps there is even in that disease hope, as Dr. Lovell says, that the condition may be controlled by some form of immunisation—provided always that it is not complicated by the existence of white scour.

I have noticed with appreciation the brief but pregnant references in the paper to the condition known as hoose. My experiences with this disease coincide entirely with what the author says. I have tried many methods of treatment, all with "varying degrees of success." Where the disease occurs it is a serious matter for the farmer on account of the backwardness and unthriftiness it produces in his young stock. I agree entirely that good feeding and removal from wet pastures are more effective than any medicinal treatment.

I should have liked to refer to some other of the points raised but I know the tendency which Congress discussions have to lag behind the time table, so I conclude by thanking Dr. Lovell for his paper, which I have read with much interest and no less profit.

General Discussion

The Chairman now declared the paper open for general discussion and invited contributors.

Mr. R. S. Roberts said that he wished to confine his remarks to one part of the problem of calf mortality, namely, calf pneumonia. Dr. Lovell had given them an excellent summary of the present state of our knowledge of this disease, but he thought that the most striking conclusion that one was forced to draw from his paper was that there was an urgent need for a concerted effort to obtain more accurate knowledge concerning the distribution, pathology, and aetiology of the disease. At present our knowledge of it was so rudimentary that it was frequently impossible to determine whether accounts of the disease emanating from different authors related to the same disease or not.

In the course of a survey which he recently conducted of the distribution of various sheep diseases, he was forced to listen frequently to the farmer's complaints of heavy losses from calf pneumonia, and he was impressed by the fact that while in some areas calf rearing was looked upon as a simple and safe enterprise, in others it was regarded as highly speculative. He thought that this patchy distribution must have some significance.

He had had opportunities recently of carrying out *post-mortem* examinations on calves dead of pneumonia. In each of ten cases he recovered in culture an organism resembling Pasteurella, and had the examinations not been carried further one might have concluded that this organism had caused the death of the animals. When cultures of this organism were tested for pathogenicity in mice they were found to be harmless in doses of 0·5 c.c. It was difficult to believe that organisms of such low pathogenicity could be the cause of the extensive pneumonia and of the death of the animals, and one was forced to the conclusion that these organisms were not the primary cause of the disease.

There were many veterinary surgeons and farmers who were convinced that they obtained extremely favourable results in the prevention of calf pneumonia by the use of serum, generally haemorrhagic septicaemia serum, and from the accounts he had obtained of the results he was not inclined to discredit these entirely. In searching for an explanation of these results he was biased by the results of experiments upon anti-salmonella sera at his own laboratory. In the course of this work they were surprised to find that normal horse serum exerted an easily demonstrable protection against bacterial infection of mice with *B. aertrycke*. These results and other experiences in the passive immunisation of animals in the field made him wonder whether they were paying sufficient attention to the effect of injections of normal serum in the control of bacterial infections.

He had Dr. Lovell's permission to refer to Mr. Turner's statement that he found that lamb dysentery serum appeared to exert a beneficial effect in calf pneumonia. He would like to make two observations in this connection. The first was that they should consider the possible effects of normal serum and, secondly, that it should be remembered that a commercial serum is not necessarily specific for the disease for which it is prepared. Horses at a serum institute may be partially hyperimmunised with two or three bacterial antigens or toxins, and the process of hyperimmunisation arrested for one reason or another, before they are used for the production of the anti-serum eventually drawn from them.

Professor Craig (Liverpool) said that Dr. Lovell had gathered together in his paper much interesting information regarding diseases of calves but it was quite evident that our knowledge of these diseases was yet very imperfect and probably confused, so that much more investigation was required for their proper understanding and control. As his time was very limited he must deal with only a few points in the paper.

Firstly, regarding the views of Mr. Sheehy on "nutritional white scour" which was apparently included in the colibacillosis, he (Professor Craig) was concerned with the enquiry from which the conclusions expressed were drawn. Mr. Sheehy proposed to carry out some nutrition experiments on a farm. On that farm the calves born there gave no trouble and were perfectly healthy. The calves to be used in the experiment were bought in. As in many dairying districts where milk production was the main consideration the calves shortly after birth and after having received one or two feeds of colostrum were sold in the market. They were subject to exposure to weather conditions and long fasts. When brought home after purchase and after being fed on milk, in a few days they became affected with scour,' with febrile symptoms, became very weak and some of them died. Those that lived remained in a sickly condition for some time. *Post-mortem* the chief changes noted were an inflammation of the stomach and first portion of the intestines and the stomach was filled with tough curds of milk. It was on account of the latter change that attention was paid to the diet, the milk being either greatly dilated or replaced by water for a few days with remarkably good results. Now from the blood and tissues of these calves *Bacterium coli* was isolated in culture. It was not, however, considered that the organism was anything more than a secondary infection which had been allowed to invade the tissues and blood after the initiation of the digestive troubles. At the present time it was difficult to say that this explanation of this trouble in calves had more

than a limited application but in any case he was not convinced by any experiments so far published that *Bacterium coli* was the primary and essential cause of this form of white scour. That *Bacterium coli* might have toxic effects when injected into a calf but that was quite a different thing from accepting the organism as the primary cause of white scour.

In regard to Salmonella infection, the late Professor Kehoe and he investigated an outbreak in the Irish Free State many years ago and the affection ran a similar course to that described by Dr. Lovell. The exact type of Salmonella was not ascertained.

In the second place an investigation into the mortality of calves in Munster was made by the late Professors Nocard and Mettam about the year 1900 (and a record of their observations was given in a brochure published by the Department of Agriculture and Technical Instruction for Ireland which was not put down as one of Dr. Lovell's references). After a limited number of experiments Professor Nocard came to the conclusion that the primary infection was a pasteurella and took place through the umbilicus at or after parturition. He made appropriate recommendations for the treatment of the umbilicus and these recommendations were put into operation with varying results.

It was a common experience in these districts in Munster where white scour appeared that in an outbreak where the calves survived the scour they afterwards became affected with "lung plague" which was responsible for their deaths. In the latter cases corynebacteria were discovered in the lesions and were regarded as secondary invaders.

In his experience outbreaks of pneumonia in calves were commonly observed without reference to white scour and it was more than probable that the outbreaks were caused by more than one aetiological factor—virus, corynebacteria, as well as defective hygiene.

With regard to helminth infections, he was somewhat surprised at their inclusion in a paper ostensibly devoted to diseases of calves only a few weeks old and he was not at all sure that calf diphtheria could be regarded as a comparatively rare disease in this country. At any rate they had some records of serious outbreaks and in them defective ventilation was not a feature. In one outbreak the disease appeared in calves born on a farm after restocking following an outbreak of foot-and-mouth disease.

In another farm the disease was evidently introduced many years ago with a cow and calf and every year since cases of calf diphtheria had appeared in the herd, particularly during those years in which there had been a good crop of calves.

Mr. N. S. Barron (Reading) observed that Dr. Lovell's remarks in connection with intestinal parasitic infections were very interesting and he rather wondered if there were not more cases in calves than they realised.

Dr. Lovell had mentioned the treatment of strongylosis by certain drugs and said that that means was not very effective in curing the trouble. He (Mr. Barron) would like to know what drugs he had used. He remembered coming across a rather serious case in which he found the causal parasite to be one of the *Ostertagia* species, together with one or two other species, and the treatment recommended was that of copper sulphate and nicotine—in fact, the same treatment as used in sheep: the dosage was about four times that for an adult ewe. The results were exceedingly spectacular. The first three calves to be treated immediately had fits; the calves rolled on the ground and for a matter of ten minutes it looked as though they were going to die; eventually, however, they got on their feet and from that time they progressed in the right direction. Since then he had heard of instances in which that treatment had been beneficial, but the dosage had been smaller. Probably when a calf was in an advanced state of marasmus it could not stand the full dose which an animal in better condition might be expected to do.

Recently a case came to his notice of scours in calves four to six months old, which the farmer said were suffering from Johne's disease. Further enquiry into the history showed that some had recovered completely after having been put on a special diet and kept indoors. That made him (the speaker) suspicious and an investigation was made. They then discovered that these calves were heavily infected with parasites. The fourth stomach was greatly thickened and contained an enormous number of helminths (chiefly *H. contortus*). In another calf evidence of Johne's disease was found, characteristic groups of acid-fast organisms being easily seen in stained smears made from the intestinal wall, *post-mortem*.

He would like Dr. Lovell to tell them whether in his investigations he had found evidence of Johne's disease in quite young calves; and if so, could he give them any idea what was the earliest time at which infection could occur?

Regarding the vitamin-A content of the colostrum, which had been referred to by several speakers, it had been shown that this could be increased in the ordinary milk by feeding alfalfa meal or dried grass. In his own experiments with ewes he had found that a ewe's milk contained a greater quantity of vitamin A when fed on dried grass than did the milk of the controls. Some ewes' and lambs' livers often showed an exceptionally low vitamin-A content and the general impression gained was that the young animal substantially supplemented its A reserve when it commenced to suckle. Therefore, when the colostral milk happened to be poor, such an animal would be more susceptible to any infection that happened to be present.

A communication was forwarded by Mr. W. Philipson Moss, of Woking, in which he stated that for the last few years he had been working in a modest way on methods of preventing losses among calves, and although he was prevented from attending the Conference he hoped that a contribution to the discussion on Dr. Lovell's paper might be acceptable.

The calf, as a potential member of the herd, had been somewhat over-shadowed in importance by the mass of legislation directed towards the earlier elimination of the screw cow. This paper, therefore, directed attention in a most constructive way to methods of ensuring the healthy herd of the future.

Dr. Williams, of America, was one of the first who attributed certain breeding faults of adults to defective management of calves. It would be interesting if Dr. Lovell could say whether a calf which eventually recovers from a severe attack of, say, coli bacillosis, ever makes up what it has lost to become a profitable member of the herd.

Of the 100 calves mentioned by Dr. Lovell 37 died from this disease, and 36 of these were under two weeks old. The bacillus is

normally present in the digestive tract, and the author considers that two of the factors which determine the course of the disease are delay in feeding and withholding colostrum. In Dr. Lovell's words "the shifting of the balance in favour of the calf therefore depends much more on methods of animal husbandry than on anything else."

Now this, in his opinion, was a most important statement. But if anyone liked to try and carry out any improvements in the present management of calves, he would find himself up against very strong prejudices in favour of certain common malpractices. He referred to the practice of tying calves next to the cow to prevent suckling, and either milking the cow twice and feeding the calf out of a bucket, or perhaps after pressure the owner was induced to allow the calf access to the cow twice or thrice a day. The gulping of quantities of milk down the mouth and nose of the hungry calf was one of the things to be avoided by allowing the calf to use the teat at will; it also saved the labour of milking the cow.

On certain farms he was permitted to make alterations in this direction, and he tried to get the cows calved in the open and left on the cow, even unprotected in winter except for a shed open at both ends. The cow, of course, was also emptied twice a day. After a few days two or even three calves were placed on the same cow or another "nurse" cow. The aim was to get the calves reared naturally for the first few weeks after which time they were still kept in the open. Where this was done he found disease was eliminated. The disease factor increased proportionately with departure from this method.

In regard to the vitamin-A deficiency mentioned, this could be overcome by supplying the cow with a cod liver oil up to a specification, from February onwards, and outdoor exercise. Some farmers were afraid their cows would get a chill if allowed out in bad weather, which was an indictment against their management. It was amazing that anyone should expect a cow to remain in health tied by its neck for months on end—treatment one would not recommend for any other animal.

Seventeen per cent. of calves died from *Corynebacterium pyogenes* infection and Dr. Lovell mentioned that the antitoxin is in the sera of normal animals; did that mean that it was also present in milk and that these calves would be protected by having raw milk for the first 14 days?

The 6 per cent. of calves which died from cocco-bacillus infection might have avoided infection by being in the open where there is less chance of mass infection.

As most calves received milk for the first week or more there could be no objection upon economic grounds to their remaining on the cow, and he would ask Dr. Lovell if there was any scientifically sustained objection to their remaining in the open, with a shed available, open at both ends.

The Reply

Dr. Lovell, replying to the points raised in the discussion, thanked the speakers for the kindly way in which they had received the paper and expressed the hope that he would deal satisfactorily with the various questions.

Mr. Gould had raised many queries, and the first was concerned with calves taking too much food naturally from the cow. If the cow was regarded as an unnatural animal secreting an abnormal amount of milk and the calf was able to get more milk and get it much more easily than it was originally intended to do, then the calf could take too much food. The point should be stressed that—as with babies, so with calves—more were ill from over-feeding than from under-feeding and although the danger was greater with bucket-fed calves, there was also a danger with calves which suckle cows giving a large amount of easily drawn milk.

Dr. Lovell had no knowledge of any figures available concerning the comparative incidence of Brucella infection and of white scour; he would suggest that any association between the two was due to the probability that a herd which is free from brucella infection is likely to be a well-managed herd.

Mr. Gould had referred to samples of cod liver oil which were not satisfactory and he (the speaker) agreed about the importance of a biological assay. Some of the *in vitro* methods used for testing such products as cod liver oil for the vitamin-A content were not specific.

Regarding the time of obtaining colostrum and the amount to be taken by the calf, Dr. Lovell stressed that colostrum should be taken as soon as possible after the birth of the calf. There were one or two reasons. One reason was that the intestine of the calf is permeable to globulins up to about two-and-a-half days and no more. Furthermore, if the calf was exposed to an infectious environment, then the sooner it got some protection the better. He had heard sometimes that calves had received colostrum for the first seven days of their life and he wondered how the latter four or five days could be accounted for, as the calf's intestine would probably be impermeable to the globulins and the secretion from the udder would not be colostrum then.

As far as he knew, vitamin A had no direct bactericidal effect; one of its actions was concerned with the local defence mechanisms of the animal and in the adult animal and incidentally in the calf, the reserves were stored mainly in the liver. The vitamin-A content of the liver of cows which were grass-fed was more likely to be high than that of the liver of cows fed upon dry foods. The meaning of over-distension had been questioned and it was intended to convey the meaning of distension due to too big a feed. A calf which is hungry would over-feed rather than one which has frequent access to food.

Mr. Turner was concerned about the exposure of calves in markets and that served to emphasise the point of view that disease processes, particularly in young stock, were not due to one factor solely, but to many. Bacteria could not propagate except in a favourable environment and they must be provided with suitable conditions in order to produce disease. He was unable to explain how white scour had been cured with lamb dysentery serum, but Mr. Roberts had put forward what seemed to be a reasonable explanation; that sample of serum probably had other antibodies present in it and it was fortunate in that particular instance.

Some reference had been made to the navel. He had not referred very much to it as a channel of infection because most of the evidence pointed to the mouth as the portal of entry in

white scours. Another point which had been raised by Mr. Turner, concerned the association between summer mastitis and the pneumonia in calves due to the same organism, *C. pyogenes*. Some recent work indicated that many normal bovine animals carry this organism in their tonsils. Not only is there direct evidence of this but also indirect evidence of this carrier state, for bovines, sheep, pigs and goats have a high *C. pyogenes* antitoxin in their blood serum, whereas horses and man have not. A reasonable explanation for the presence and distribution of this antitoxin is the correlated presence of the organism in a large number of animals of those particular species. The view is gaining ground that *C. pyogenes* infections are endogenous in development, producing, say, pneumonia in a calf and mastitis in a heifer.

He had no intention of criticising the diagnosis of Mr. Turner's outbreak of pasteurellosis. He was, however, concerned with the classification of the isolated organism. Some years ago in America a certain haemolytic cocco-bacillus was grouped with the Pasteurella but as many people would not admit it to this genus the position became confusing. Classification was important. If they were going to discuss anything at all, they must speak in the same language. Pasteurellosis exists in this country for he had isolated Pasteurella from diseased calves, but he believed that the commoner so-called Pasteurella infection was really due to this haemolytic organism which some call a Pasteurella and some do not.

Captain Campbell had dealt with colibacillosis and mentioned especially the special strains of *Bact. coli*. *Bact. coli* were normal inhabitants of the intestine, but they consisted of a collection of organisms, differing in their antigenic structure. Non-pathogenic ones were not very stable in that respect but apparently some strains of *Bact. coli* became stabilised and virulent by passage through weakly animals. He had examined by serological methods well over 100 strains isolated from diseased calves and there were seven different types and then some left over. One serological type might be of special importance on a particular farm and, as an example, the same serological type of *Bact. coli* had been recovered from two diseased calves from the same farm with several months' interval. This fitted in with the early work of Jensen when he found in about 1890 that serum prepared against one strain would not necessarily protect calves against other strains. He thought the position was that here we have a transition from the normal non-pathogen to one capable of producing an epidemic of white scour.

Captain Campbell had also referred to any difference in the vitamin-A content of cow's milk in the autumn and in the spring. He (Dr. Lovell) did not know of any definite work carried out regarding that comparison, but the assumption of there being a difference was based upon the available grass fed to the cows.

A reference had also been made to joint-ill and the question raised, "Why was joint-ill not put down as a separate condition from white scours?" If both are caused by the same organism there was little reason for separating them, for the whole object of diagnosis was to find out the cause of the disease, so that one could adopt rational preventive measures and therapeutics. He agreed that joint-ill might follow infection with other organisms and that *Corynebacterium pyogenes* was one cause of arthritis.

The experience of Mr. Roberts with the incidence of calf diseases corresponded with some figures that he was analysing. There was an enormous variation not only from one end of the country to the other but from farm to farm.

Pasteurellosis had already been dealt with, but he would repeat that the true disease was not so common here. The pasteurella isolated from true pasteurellosis was pathogenic for laboratory animals whereas the haemolytic cocco-bacillus was relatively non-pathogenic. Professor Craig had given interesting details of the work of Sheehy for which he was grateful and he agreed that the so-called functional white scours would probably lead to a colibacillosis. The deliberate production of white scours by *Bact. coli* had been known from the time of Jensen onwards and at the moment he and his colleagues were trying to extract the toxic fraction from strains of *Bact. coli* by chemical methods. The fraction isolated was extremely potent for calves and he thought there was little doubt that *Bact. coli* could actually cause diseases such as white scour.

Helminths sometimes caused disease in calves and he included a summary in the paper in order to make it complete. With regard to the incidence of calf diphtheria, he would refer Professor Craig to the fact that according to published records it was rare, but in that connection he did wish that practitioners, when they met with outbreaks, would record them. The causal organism, *Fusiformis necrophorus*, mentioned by Professor Craig, was probably brought in by the animal, but he still believed that its activities were aided by ill-ventilated stables.

Mr. Barron had asked him about the treatment of Strongylosis infection, but he feared he had no knowledge of the matter. He should like to thank him for drawing attention to the Johne's disease he had met with in calves up to about five months of age. During the last two or three weeks they had isolated what was probably Johne's bacillus from a seven-month-old calf, so that the evidence seemed to accumulate that calves became infected with Johne's disease quite early in life—just how early they did not know.

He once again thanked his hearers for the kindly way in which they had received his paper.

The Chairman now rose to say that, before they closed that meeting, he was very pleased indeed to be able to propose, through the Chair, that a most hearty vote of thanks be accorded to Dr. Lovell, not only for his excellent paper, but for the very able and helpful manner in which he had dealt with the points raised by the various speakers during the course of the discussion. The value of Dr. Lovell's paper had been fully reflected in the scope of the discussion which it had evoked: it lay, of course, mainly in the fact, or sprang mainly from the fact, that Dr. Lovell was himself there speaking mainly on conditions of which he was himself an authority and he had presented them with a concise summary of the situation as it exists to-day, for which he was sure, they were all very much indebted to him. (Loud applause.)

The Veterinary Record

September 2nd, 1939.

Some Universal Problems in Scientific and Professional Education

A PRIME DUTY, we need hardly recall, forced upon this journal for almost precisely a year has been to give prominence to the problem of veterinary education. We are happy to discern in the prevailing mood of the veterinary profession that in no small measure the task undertaken has served its purpose. Amidst the stress of the present international situation it is not easy to pursue this task calmly to its more complete fulfilment, overwhelming in importance to the standing and future of our profession as the subject under analysis must be recognised to be in more settled times. We have felt impelled nevertheless to return to the subject this week by reason of our reading of analyses of pertinent and parallel phenomena in contemporary scientific and professional literature. In truth, the problems which beset the veterinary educationist are not unique. We may, therefore, reflect with some advantage upon certain universal tendencies in the planning of scientific and professional education. These tendencies entail recognition of one sense in which a given system of education, designated at the same time as scientific and professional, represents a disciplinary and doctrinal unity, and of another sense in which these two designations are, in large measure, incompatible and imply consequently essentially different systems of training. Fortunately, to illustrate our meaning more precisely, we have available three short articles that are reproduced, following closely the sequence of our meaning, from last week's periodical literature.

Firstly, as further illustration of what has now come to be accepted as commonplace, namely that from the standpoint of scientific or laboratory research, veterinary science rests on a common foundation with medical research, and indeed with many other forms of—and perhaps all—scientific research, we reproduce a short article by Sir Charles Martin, upon the opening of the new Institute of Medical and Veterinary Science, Adelaide, Australia. The Director of the Institute, Dr. E. Weston Hurst, will be well known to, and highly esteemed by, veterinary scientists for his earlier work at the Lister Institute, London, where in the pursuit of his studies upon the pathology of virus diseases affecting the central nervous system, commencing with those upon human poliomyelitis, his work came to embrace researches upon louping-ill in sheep (and in fact, he was himself an early victim of this malady). Early in his career, therefore, he had become forced in the light of his own experience to recognise the essential unity of medical and veterinary scientific research. There is no need to stress, by further example, the conclusions drawn from wealth of evidence by Sir Charles Martin at the end of his article.

Secondly, at this season of the re-opening of the medical schools, our contemporaries, the *Lancet* and *British Medical Journal*, devote each a whole issue to the subject of medical education, with the special object of guiding the prospective student upon his career. The leading article entitled, "Drastic Remedies," which we reproduce from the educational number of the *Lancet* illustrates the almost insuperable obstacles that confront the medical profession in providing the medical student with an ideal professional education. "Let us frankly admit," the *Lancet* says, "that up to the present no way has been found." We may take heart in the veterinary profession that in spite of the many obvious shortcomings in our own system of education we do not in this respect stand alone in our perplexities. The real truth which is elaborated elsewhere with great skill and perspicacity in the above issue of the *Lancet*, seems to reside in what is implied in the opening sentence of the editorial article: "*The strenuous years of the curriculum proper are only a small part of our medical training, which starts at school and goes on through life; but it is these years that have come in for most criticism.*" [We italicise this significant statement.]

Thirdly, in view of the grave concern felt by many eminent scientists upon the disastrous social applications of their own discoveries, our distinguished contemporary, *Nature*, last week published a deeply thoughtful editorial article, entitled "The Basis of Leadership"; we cannot escape the conviction that what is argued in profoundly serious mood in this article is, in many respects, a restatement of what is written in language that is flippant only apparently in the *Lancet* editorial. Two separate and distinct types of education are brought into relief

in the *Nature* article, the one destined for the training, mainly intellectual in purpose, of technical and scientific workers, and the other, for the provision of leaders in society, in which "intellectual values are definitely subordinated to training in character." We venture to assert that, with little imaginative transposition of detail, what is implied as the ideal system of training for leadership applies with great force also to the training of members of our own profession, as indeed of any profession, who have to deal directly with large numbers of human beings belonging to various walks of life in the course of their daily work; in other words, to the training of men and women for independent general practice. Quoting, in a concluding paragraph, words used recently by the President of the Royal Society, to which we would wish to draw special attention, the *Nature* editorial says:—

"In their growing concern for the social consequences of their work they [the scientists] are conscious that the spirit in which knowledge is sought and the manner in which it is used may be more important than knowledge itself. They themselves have to supply the natural knowledge for a solution of the problems of society, and help in its application. Their effectiveness depends equally, however, on their moral influence, on the devotion, wisdom and goodwill which they bring to their task. . . ."

A compact social institution such as is represented by a professional organisation founded long before the onset of the modern era of scientific research to render special direct service to the community must inevitably in its evolution become more and more differentiated in its sub-grouping. This tendency is very largely reflected in a perspicacious article published in the *Lancet* issue entitled "Choice of Career," the opening paragraph of which reads:

"The newly qualified doctor has before him a wide choice of careers. 'Being a doctor' is by no means one profession, and too many young medical men slip into one or other of its branches without realising what the choice entails. It is very important that he should choose that career for which he is fitted by intelligence, aptitude, interest and financial means. At the best a wrong choice at the outset may end in a re-start and wasted time; at the worst in the misapplication of a whole life. For this reason a young doctor should be careful not to enter on his life's work by taking the line of least resistance or by being led astray by mere names. As an example of the former, many enter general practice simply because their fathers have a practice into which they can step, although they are by nature wholly unfitted for it. As an example of the fallacy of names, it is not unknown for idealists to enter the Public Service thinking that it will give them the best opportunities for public service, only to be terribly disillusioned."

We need not dwell further upon our intended meaning in the light of the above evidence culled from distinguished contemporary sources.

Although, as has been stressed by Professor Leclainche, veterinary medicine represents an essentially eclectic body of doctrine, and we contend therefore with strong reason that its exercise ought always to be confined to a highly trained and strongly protected institution organised as a profession, yet, no less than in the medical profession, the composition of this group in human talent must tend to be highly diverse, and become so in future increasingly. What we believe to be most important at this juncture in our development is to recognise this essential diversity in our constitution, and, having regard to the rapidly growing contribution of our scientific component to our advancement, to ensure, firstly, that those specially destined to apply this knowledge in general practice are subjected to a system of training so that they become endowed and equipped as far as is possible with the attributes of character that command the confidence of the public and, secondly, that our whole ethical professional code is beyond reproach. In this way, human talent will not be wasted and no "crises" are likely to arise within our ranks.

MEDICAL RESEARCH COUNCIL

By an Order of the Committee of Privy Council, made after consultation with the Medical Research Council and with the President of the Royal Society, Professor A. J. Clark, M.C., M.D., F.R.C.P., F.R.S. (Professor of Materia Medica in the University of Edinburgh), and Professor T. R. Elliott, C.B.E., D.S.O., M.D., F.R.C.P., F.R.S. (Emeritus Professor of Medicine in the University of London and consulting physician to University College Hospital), are appointed members of the Medical Research Council, in succession to Professor H. S. Raper, C.B.E., D.Sc., M.D., F.R.C.P., F.R.S., and Professor J. A. Ryle, M.D., F.R.C.P., who retire in rotation on September 30th.

* * * * *

For cruelty to a cow by tying the animal's horn to its forefoot by a rope so short that it was unable, according to an R.S.P.C.A. inspector, to hold up its head, a farmer has been ordered to pay a fine and costs amounting to five pounds by the Helston magistrates.

CLINICAL COMMUNICATION

The Use of Sodium Hyposulphite and Hydrochloric Acid in the Treatment of Mange

Dr. C. GOROVITZ
Tel-Aviv, Palestine

Among the dogs brought into my surgery on March 10th last was a two-year-old mongrel affected with follicular mange. Its owner informed me that it had been suffering for six weeks and had been under treatment consisting of the rubbing in of ointment (sulphur) and liniments (balsam of Peru dissolved in alcohol) on the lesions. Seeing that that line of treatment had not proved beneficial, he contemplated destroying his pet. Having read about the excellent results claimed in U.S.S.R. recently, for the use of sodium hyposulphite and hydrochloric acid in the treatment of all kinds of mange, I decided to test the efficiency of that method. On that very day the dog was clipped and washed well with soap and water and on the morrow I commenced the remedial measures.

Although in Russia a 60 per cent. solution of sodium hyposulphite is employed, I availed myself of a 40 per cent. solution, since the patient was quite debilitated. The whole of its body was dressed by means of a brush on to which as much of the liquid as was necessary was poured from a bottle. After about a quarter of an hour the animal's integument became covered with a whitish powder, which constituted the indication that the solution had already dried. It was thus also rendered possible to discern the places that had not been reached by the fluid and were now devoid of the whitish coating, a fact which enabled correction. Then its entire skin was smeared with a 5 per cent. solution of hydrochloric acid in the same manner that had been adopted for the application of the initial solution, care being taken that not a drop of the latter should fall into the former which might, otherwise, have lost its efficacy.

When the dog had dried completely, the whole process was repeated in order to ensure a thorough admixture and an adequate penetration of the medicinal agents. It was subsequently left for three days, it having been found that the sulphur which forms acts on the parasites only within first 72 hours following the application of these drugs. At the end of that period, assuming that by that time the sulphur had killed the parasites and their eggs, I ordered a bath for the dog.

According to Soviet experts, it sometimes happens, at the beginning of the disease, that a single such course is sufficient, but if deemed requisite it is repeated. In the case reported I found it compulsory to repeat this course six times, the treatment on each occasion lasting one hour. The complete treatment from the day of the dog's arrival at my clinic until a cure was affected lasted 20 days.

The second case was a two-year-old black dachshund affected with follicular mange. I first treated him with Styrax ointment and then with sulphur sublim. with ol. Rusci. At last I decided to try the treatment by hyposulphite. I repeated the whole process six times (a second time immediately after the first one), each time with an interval of three days. The complete treatment lasted 15 days. This time I employed a 60 per cent. solution of sodium hyposulphite and a 6 per cent. solution of acid hydrochloric. After the last course I found no more parasites with the microscopical examination. The dog's hair had grown nicely and the animal was completely cured.

In the third case—a two-and-a-half-year-old black spaniel which came from Vienna—the animal had suffered badly for a long time. In Vienna, as well as in Prague, it had been treated by the method of rubbing in ointments against pruritus. In Palestine the dog was treated against pruritus but no microscopical examination had been made. The dog was brought to me on June 27th. Microscopical examination showed me that the animal was affected with demodicosis. On June 28th the dog was washed well with soap and water, and I began my treatment, which consisted of using the solutions of sodium hyposulphite and acid hydrochloric. In this case I repeated the course eight times, each time with an interval of three days. I employed also a 60 per cent. solution of sodium hyposulphite and a 6 per cent. solution of acid hydrochloric. After the third course the dog stopped scratching himself, and after the eighth the microscopic examination showed me that there were no more parasites. The dog was cured: its hair grew nicely.

The subject of the fourth case was a one-year-old black French Alsatian affected with *Sarcoptes* var. *canis*. At first it had been treated by ointments. On July 13th the dog was washed well with soap and water, and I began my treatment with a 60 per cent. solution of sodium hyposulphite and a 6 per cent. solution of acid hydrochloric. In this case I repeated the course six times, each time with an interval of three days. After the sixth course the analysis was negative; here again the dog was cured and its hair grew nicely.

The chemical reaction of this method may be explained in formulae thus: $Na_2S_2O_3 + 2HCl = 2NaCl + H_2S_2O_3 = 2NaCl + H_2SO_3 + S = 2NaCl + H_2O + SO_2$ (anhydrous sulphurous acid) + S (sulphur).

It is obvious that the two effectual factors here are (*i*) the sulphur in a pure state; (*ii*) the anhydrous sulphurous acid.

Neither the sodium hyposulphite nor the hydrochloric acid, *per se*, produces any effect whatsoever on the mites.

Anhydrous sulphurous acid (SO_2) is known as a substance which kills mange parasites, and this is the reason for its use as a means of curing mange in gas chambers. Sulphur is also a well-known remedy against mange and it is especially effective in its native state and during the first three days. The poisonous properties of sulphur are mainly effected by oxygen and the humidity of the air. Under their influence the sulphur undergoes a constant chemical reaction:—

$$S + 2O = SO_2; \quad SO_2 + H_2O = H_2SO_3;$$
$$H_2SO_3 + S = H_2S_2O_3.$$

This reaction gives: first, SO_2; later, H_2SO_3; and finally, $H_2S_2O_3$, which separates into S and H_2SO_3; the latter is again separated into $H_2O + SO_2$ and this gives us the sulphur and anhydrous sulphurous acid.

$H_2S_2O_3 = H_2SO_3 + S$; $H_2SO_3 = H_2O + SO_2$.

This reaction is repeated several times until the activity of the sulphur is weakened to such an extent that the reaction stops.

According to Rudionov, around every particle of sulphur there is created a union of little activity which interferes with the next chemical reaction of sulphur.

Conclusion

Various means of dealing with mange, such as ointments, baths and gas chambers, have a deleterious influence on the health of the animal undergoing treatment, and require much time, for which reasons these procedures are not rational. The treatment with sodium hyposulphite and hydrochloric acid is cheap, clean, convenient and does not harm the patient. Furthermore, the owner is relieved of the tedious and unpleasant task of treating his charge himself, and what is still more important, perhaps, is that he is presented with no chance of interfering with the favourable progress of healing by any erroneous manipulation on his part.

For the treatment of mangy domestic canines this method is most suitable from all points of view. In Russia experiments have been conducted on horses (infested with all kinds of scabies), treated with a 60 per cent. solution of sodium hyposulphite and a 10 per cent. solution of hydrochloric acid, even in winter (provided the temperature is not below 8° C.), camels, sheep, rabbits (scabies auricularis) and an absolute success is claimed for this method—named after its discoverer "Professor Demianovici's Method"—and which has been introduced into all the veterinary hospitals throughout Russia. It would, therefore, be advisable to examine the efficacy of this method in different countries and see how its utility applies to horses, cows, camels, sheep and rabbits—and, in the event of obtaining good results, to widen its utilisation.

As regards the dog, I wish to recommend the use of this method, when, even in the case of a heavy infestation, a single bathing is sufficient.

N.V.M.A. DIVISIONAL REPORTS

South Wales V.M.A.*

MEETING AT ABERYSTWYTH

A Quarterly Meeting of the South Wales Division N.V.M.A., was held at University College (New Laboratory Buildings, Llanbadarn Road) Aberystwyth, on June 9th, 1939, at 2.30 p.m.

The President, A. D. J. Brennan, Esq., occupied the Chair, and also present were: Messrs. A. F. Good, J. S. Pike, Dr. G. B. Brook, Messrs. G. Thos. Cattell, H. M. Duff, F. V. John, D. Bain, C. V. Davies, R. Dudlyke, A. T. Morgan, R. J. Thomas, Thos. Davies, A. J. Cattell, G. J. Crawford, John Reid, A. F. Butler, A. Parry, W. Davies, D. J. Davies, H. N. Kennedy, Chas, Sweeney, A. C. Howse, Charles Watson, D. H. Thomas, J. Campbell Hill, D. J. Anthony, P. MacGregor, P. A. O'Neill, T. R. Thomas, W. D. John, A. J. Reynolds, W. Ross Cockrill, D. J. Macauley, R. McNeil and T. H. Jones (Hon. Secretary). Dr. J. R. M. Innes and Mr. E. W. Ascoli were present as visitors.

Apologies for absence were received from Messrs. J. E. Thomas, J. F. Rees, E. Pugh, L. Morris, W. T. Rowlands.

Before opening the meeting, the President moved that the sincere sympathy of the Division should be conveyed to Mr. J. Stanley Pike, Mr. Brinley Sayer and the relatives of the late Mr. H. L. Gravelle, in their recent bereavements.

The minutes of the last meeting, having appeared in the *Veterinary Record*, of June 3rd, it was agreed that they should be accepted and signed by the President.

Election of Office-Bearers

The following officers were elected:—

Vice-Presidents.—Mr. J. Stanley Pike (retiring President), and Mr. Chas. Watson, Haverfordwest.

*Received for publication July 25th, 1939.

Auditors.—J. C. Hill and F. V. John.

Representatives to the Welsh Branch.—The President, Mr. W. D. John and Mr. T. H. Jones.

New Members.—The following were elected to membership of the Division: Messrs. A. Houston, C. Sweeney, T. Davies, C. V. Davies, G. J. Crawford, P. A. O'Neill, D. Ll. James and John Reid.

Resolutions

The following resolutions were passed :—

(1) *Dr. Griffith Evans Memorial.*—It was unanimously agreed to support the Welsh Branch to inaugurate a Dr. Griffith Evans Memorial Fund.

(2) *P.D.S.A.P.*—" The Division is in agreement with the principle of co-operation with the P.D.S.A.P., but disagrees with the formulation or acceptance of the scheme without previous consultation and discussion with the N.V.M.A."

(3) *Loveday Report.*—" Although in agreement with many of the recommendations of the above report, it is urged that the paramountcy of the R.C.V.S. and the one portal system be secured, also that the limiting of Veterinary Institutions as suggested in the report be not accepted."

(4) *Poultry Technical Committee.*—" That arrangements be made to have poultry experts to give lectures and demonstrations at the Divisional meetings."

(5) *N.V.M.A. Congress.*—Several members expressed their desire to have the Annual Congress of the N.V.M.A. in South Wales. It was stated that the Association had never visited South Wales and that Cardiff would be an ideal centre. The members were unanimous that an invitation should be sent.

Correspondence.—(1) From the General Secretary, N.V.M.A., stating that many farmers had been persuaded on the strength of various guarantees to purchase remedies for the treatment and cure of contagious abortion and sterility in cattle, and that in each case it is alleged that the preparation proved of no value for the condition for which it was prescribed. In two cases it is also alleged that the farmer has been unable to obtain the compensation promised by the manufacturers in the event of the preparation failing to give the results guaranteed.

The President said that this was important to farmers and asked that if any member could provide evidence of the nature required, he should report it to the General Secretary.

(2) Another letter from the General Secretary concerned the A.R.P. service for animals in the event of Air Raids.

It was agreed that one member of the Division be appointed to each Borough or County Administrative area.

These members were asked to see their respective A.R.P. Committees and offer their services for dealing with animals in cases of emergency.

The following were appointed: Llanelly Borough, Mr. J. Campbell Hill; Pembrokeshire, Mr. Charles Watson; Breconshire, Mr. A. J. Cattell; Carmarthenshire, Mr. J. F. Rees; Cardiganshire, Mr. A. Parry; Glamorganshire, (to be appointed).

Demonstrations and Lecture: Bovine Tuberculosis

Dr. G. B. Brook unfortunately was unable to give his address on the significance of clinical examination in the control of bovine tuberculosis.

He, however, gave a most interesting and instructive demonstration on the collection of sputum direct from the ox using the Rautmann Cup, Muller-Bech Trachial Swabber and the Scharr-Opalka Tracheal Canula (see *Veterinary Record*, 1937).

A description of the instruments and their use was supplemented by a series of illustrations shown with the epidiascope. A practical demonstration followed on living animals; one yielded an excellent sputum strongly positive for acid-fast bacilli on microscopic examination. The methods were of importance to the practitioners and to veterinarians engaged in tuberculin testing especially those called upon to investigate breakdowns in supposedly tuberculosis free herds.

As Dr. Brook was unable to give his paper, Dr. J. R. M. Innes, Cambridge, at very short notice kindly consented to give a lecture and demonstration on the comparative pathology and pathogenesis of bovine tuberculosis. As the substance of this lecture had already been utilised to form the basis of a publication for another journal, it has been impossible to reproduce the lecture in the proceedings of this branch. After discussing briefly the effects of tubercle bacilli on tissues and the lesions produced in different animals by organisms of different virulence, Dr. Innes proceeded to give a short summarised account of the disease in man. It was emphasised how in man the disease can be divided into a primary infection stage, a period of generalisation of the disease which follows soon after the primary infection, and a period occurring relatively late in life when phthisis develops—with the production of chronic isolated pulmonary tuberculosis. The primary infection stage or childhood type of tuberculosis is characterised by the frequently inconspicuous character of the original primary lesions, the early severe involvement of the lymphatic system, and the tendency to extensive and often fatal spread by haematogenous paths. Chronic isolated pulmonary tuberculosis of the

adult type is due to a reinfection either exogenous or endogenous in origin and results in a disease process which remains localised to the lungs for a long period ; lymphatic involvement is inconspicuous. In animals the course of the disease is very different ; probably only in the case of the bovine animal can there be any strict analogy with the process in man. The origin of primary infection in calves was dealt with, particular attention being paid to congenital infection. The varied pathology was discussed with particular reference to tuberculosis of the lungs and the udder. The classification of Nieberle regarding the recognition of three clearly distinctive disease types in the udder was emphasised as an important observation. The lecture was fully illustrated by means of lantern slides and photographs.

There was unfortunately no time for discussion. The PRESIDENT thanked Dr. Innes very gratefully for his most informative discourse.

The members then adjourned for tea, following which they met at the slaughter-house to witness Dr. Brook's demonstrations.

These demonstrations were greatly appreciated, particularly that of the Rautmann Cup method.

A very enjoyable afternoon was brought to an end by the PRESIDENT again thanking Dr. Innes and Dr. Brook, also the College Authorities and staff for the use of the new college buildings and of the epidiascope.

T. H. JONES, *Hon. Secretary.*

AGRICULTURAL ADVISER APPOINTED

In further development of the organisation which would be set up by the Government in the event of war to bring about an increase in food production in this country, the Minister of Agriculture and Fisheries has appointed Mr. W. Gavin as Agricultural Adviser designate. Mr. Gavin will advise the Department on questions arising in connection with the food-production campaign and will act as liaison officer between Headquarters and County Executive Committees. Arrangements have been made for Mr. Gavin to take up his duties forthwith in an honorary capacity and he will co-operate with Chairmen-designate of the County Committees in the preparatory work which is now being undertaken.

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UNIVERSITY OF LONDON B.Sc. (VETERINARY SCIENCE) EXAMINATION

The following is the Pass List (July, 1939) for the above examination (internal and external students): Ascoli, Eric Walter; Bunker, John Albert; Crowther, Robert Wade; Roach, Robert Weller; Spriggs, David Neville; Studdy, Edward Victor Henry, and Taylor, Douglas William Bulpin (all of the Royal Veterinary College).

The Late Mr. Robert Simpson, F.R.C.V.S., D.V.S.M.,

Deputy Chief Veterinary Officer, Ministry of Agriculture and Fisheries

AN APPRECIATION

As recorded in our issue of August 26th, the hand of death has again been active amongst our ranks and removed Robert Simpson from our midst at the early age of 46.

Born in Midlothian in 1893, he was educated at Daniel Stewart's College, Edinburgh, and studied at the Royal (Dick) Veterinary College where, after being the recipient of eleven class medals, he graduated in 1914. He immediately joined up in the Army in response to his country's needs, was mentioned in despatches and received the 1914-15 Star and the British War and Victory Medals. He obtained a regular commission in 1917, but was placed on the retired list in 1919. In 1920 he was awarded his Fellowship by the Royal College of Veterinary Surgeons and also the same year he obtained the Diploma of Veterinary State Medicine, being one of the first to qualify for this. During the next four years his time was divided between the Ministry of Agriculture and Fisheries and the Scottish Department of Health. When in 1924 he was appointed Chief Veterinary Officer to the County Council of Cumberland he had the distinction of being the first whole-time veterinary officer to be appointed for a county in England. During the 14 years he held this appointment, for he joined the staff of the Ministry of Agriculture in 1938, he contributed many articles to the veterinary Press on public health subjects and also read papers before the Congress of the National Veterinary Medical Association and Royal Sanitary Institute, as well as at many Divisional meetings.

He was a past-President of the Dumfries and Galloway Division of the "National" and of the Society of Veterinary Officers. In 1930 he was elected a member of the Council of the Royal College of Veterinary Surgeons and has served continuously on many of its committees since that date. At the time of his death he was Chairman of the Parliamentary Committee.

For many years he was on the Council and a member of many committees of the National Veterinary Medical Association and at the Congress at Scarborough in 1936 he was elected President—the highest honour the Association could offer. His year of office was an exceptionally strenuous one, for it was during that year that the Association was on the look-out for new premises as the rooms occupied in Gray's Inn were totally inadequate. It was

Simpson who, along with the Committee, looked at numerous premises and finally settled on the present commodious and convenient building at 36, Gordon Square. There was considerable opposition to the acquiring of this, as it was thought by some that the Association would become bankrupt if it launched out into such extravagant premises. Simpson, however, thought otherwise and it was chiefly due to his far-seeing judgment that the selection was finally made. To the writer of this biography he confessed his nervousness at pushing for the change, but he "stuck to his guns" in the belief that the Association was worthy of the new premises, and it is doubtful if even one could be found to-day to deny this!

It was also during his Presidency that the Agriculture Bill of 1937 was before Parliament and when the negotiations between the National Veterinary Medical Association and the Ministry in connection with the State Veterinary Service first commenced. He was one who pressed for the formation of the Consultative Committee which was finally formed and which has done so much to smooth over some of the inevitable difficulties which the change produced. It was Simpson who led the deputation which interviewed the Minister of Agriculture, the Rt. Hon. W. S. Morrison, M.C., K.C., M.P., and by his tact and yet plain speaking placed the views of the Association before the Minister. There can be no doubt that the good feeling engendered by this interview did much to improve the position of the profession with those whose duty it was to shape the new service. It was due to his influence as President that the Minister attended the banquet at the Congress at Bournemouth with such conspicuous success. It was an open secret that Simpson was consulted confidentially about the position of the profession in the new Service and yet he never gave any information away, even to his closest friends. Tactful and conciliatory though he was, he never gave in on any matter of principle which could in any way bring about a loss of status to his profession—a matter which was always closest to his heart.

Simpson was one of the three Local Authority Veterinary Officers selected by the Ministry to act in an advisory capacity and to sit on the committee which interviewed all the candidates for promotion prior to the setting up of the new Service—Ministry and Local Authority officers alike. Being "on loan" to the Ministry from his Local Authority from the end of December, 1937, to March 31st, 1938, he finally joined the Ministry from April 1st, 1938. When on the retirement of Sir John Kelland early last summer, Robert Simpson was appointed as one of the two Deputy Chief Veterinary Officers, the selection was thoroughly approved, not only by his colleagues but by the profession as a whole. It was felt that he had a sound grasp of the duties transferred from Local Authorities to the State and it was confidently expected that he would have a long and useful career before him. Providence has thought otherwise and his death has come as a great shock and blow, not only as regards the personal loss but as a loss to the service which he had so much at heart.

To his wife and two children we extend our heartfelt sympathy and trust it may be some comfort to them to know that his colleagues are sharing their sorrow, for "Bobbie Simpson," as he was sometimes affectionately called, will be genuinely and sincerely missed.

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The Funeral

A large number of friends attended at Causewayhead Church, Silloth, Cumberland, on August 24th, where the funeral service took place and where the body was laid to rest in the quiet country churchyard. The service was conducted by the Rev. Mr. Lamont, and amongst members of the veterinary profession present were: Messrs. H. B. Allan, J. Cameron, A. Douglas, J. G. McGregor, J. N. Ritchie, John Reid and D. S. Rabagliati (representing the National Veterinary Medical Association).

Amongst the many beautiful flowers were wreaths from "his friends and colleagues of the Animal Health Division" of the Ministry, the Association of Veterinary Inspectors, the Royal College of Veterinary Surgeons and the National Veterinary Medical Association.

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STALLION LICENCES IN SCOTLAND

The Department of Agriculture for Scotland have issued a statement setting forth the details of the licensing of stallions in 1939. "These figures are interesting," says the *Farming News*, "as showing the gradual reduction in the last four years in particular. Taking Clydesdales as the principal breed concerned, we find that there were in 1939, a total of 467 applications of which 459 were passed. This is the smallest total since 1935 when 440 licences were issued out of 453 applications lodged. There was an upward spurt in 1936 when 482 licences were issued out of 498 applications. The position continued firm in 1937 when of 497 applications 487 licences were granted, and again in 1938, of 485 applications 475 licences were issued. It will thus be seen that for the present year there has been a considerable drop. One may assume, on glancing over these figures, that on the whole soundness is improving, for of ten specified ailments only three are specified as causes of rejection. These are: shivering, 3; roaring or whistling, 1; and sidebone, 2. Another interesting feature of the figures now issued is the continued notable soundness of Highland and Shetland ponies. In the last nine years only two Highland ponies were rejected for unsoundness and just one Shetland pony."

THE EFFECTS OF WAR GASES ON ANIMALS

We have been requested to give a short note on the above in this issue, in view of the possibility that some veterinary surgeons may not have been able, as yet, to secure this information from other sources.

Tear Gases and Nasal Irritant Gases

"Tear" and "nose irritant" gases have little effect on animals. They stand quietly and unaffected in a concentration of tear gas that will close the eyes of a human being in a few seconds. Even in high concentrations of nasal irritant gases animals behave quietly, and apart from some sneezing and a watery discharge from the nose, no ill-effects follow. Horses can be worked immediately after exposure to these gases.

Choking Gases

Chlorine.—The immediate effects are irritation of the throat with coughing. It attacks the lungs and may cause bronchitis, pneumonia, and even collapse followed by death. Animals which have been exposed, or are suspected of having been exposed, to this gas, should be kept as quiet as possible and moved with as little exertion to the animal as possible to a convenient place, allowed plenty of fresh air, and the body warmth maintained by rugging up.

Phosgene and Di-Phosgene.—In acute cases slight spasms of coughing may or may not occur, and, owing to the delayed action of this poison, symptoms may not develop until 12 or 24 hours after exposure. Breathing becomes hurried and difficult, the nostrils widely dilated, temperature rises, and there is a nasal discharge, at first foamy but later becoming thick and blood stained. Death may occur by the 48th hour. In milder cases the patient has a general appearance of depression, eyes staring, nostrils dilated, hurried breathing and a slight rise in temperature. There is a tendency to cough. Recovery takes place in four to six days.

First Aid Treatment for Phosgene Gases

(*a*) *Large Animals.*—The first essential is to remove the animal from the dangerous atmosphere. To prevent the breathing of more gas during this stage, nosebags lined with damp hay should be put on, or two nosebags telescoped with damp hay or chaff between them may be used. Harness and saddlery should be removed from horses which should be moved slowly, with frequent rests, to a place of safety, *i.e.*, upwind of the gassed area or to high ground. Excessive movement or the lightest work will aggravate the condition of the animal and may lead to death. If ambulance transport is available it should be used. Keep the animals in the open air, rugs and bandages being put on for warmth. Slight cases should be treated as serious cases because of the possibility of more serious symptoms developing later. Convalescence is slow. Horses should be brought gradually and carefully back into work after recovery.

(*b*) *Small Animals.*—Small animals should be removed at once from the dangerous atmosphere and in doing this protection should be provided by swathing the head or the entire animal in a blanket. They should be kept confined but *allowed plenty of fresh air,* warm clothing and good nursing.

Blister Gases

Blister gases are most likely to be used by raiding aircraft on account of their persistence and casualty-producing powers. Such gases can be released from bombs or as a spray. When used in bombs the extent of the contamination produced will depend upon the size of the bomb and on the nature of the ground upon which it falls. In general, such contamination will be heavy but localised. When sprayed from the air these gases fall in the form of drops of liquid which may contaminate a wide area. The area affected and the degree of contamination will depend upon the quantity released, the height from which it is discharged and the weather conditions prevailing.

Blister gases exert their harmful effects when they come into contact with the body, in the form either of liquid or the vapour given off the liquid. The most likely to be used in warfare are mustard gas and Lewisite. The former was the most effective gas used during the last war and was known by the Germans as "Yellow Cross" and by the French as "Yperite." Lewisite is the more dangerous and acts quicker than mustard gas, and is therefore more easily recognised.

Mustard Gas either in the liquid form or as a vapour attacks any part of the body with which it comes in contact. The horn of the hooves of the larger animals is, however, sufficiently resistant to afford protection. *In these animals the fact of the cushions of the heels being covered only by fine skin and being very near to the ground renders the back of the foot the most likely part to be attacked by liquid blister gases.* Injured tissue is slow to heal and very prone to become septic. Fortunately the larger part of the body surface is protected by a natural coat which serves as a first-line defence against liquid gas. In the case of the horse and similar animals the liquid gas tends to fall down the hairs and collect as small droplets. This point must be borne in mind when handling contaminated animals or carcases. Unlike man, animals do not blister when contaminated on the skin with mustard gas. A swelling marks the affected areas of skin, but this subsides to leave a hard wrinkled area of dead skin which finally separates and leaves a sore (ulcer). With light contamination the skin may be consolidated and new hair grow when the dead skin will flake off similar to a sitfast. Heavier contaminations cause deep-seated ulceration followed by sloughing. In favourable cases healing will take eight to ten weeks. The smallest drop of liquid gas on the eye causes serious injury. Within ten minutes there is a copious flow of tears and the animal rubs the affected eye against any convenient projection. The eyelids swell and later a thick discharge comes away. In the acute stage the eyelids are closed and temporary blindness results. This stage passes off in the second week but complete healing may take months. Heavy contamination may lead to permanent blindness.

Animals moving over contaminated ground may receive injuries to the limbs according to the nature of the ground surface. On grassland, the front and sides of the legs are chiefly affected, but, where the "going" is heavy, as on plough or muddy land, the fine skin of the heel and that between the claws or toes will suffer. The hocks may also be injured from splashing. The injuries are particularly prone to infection and may cause intense lameness, inability to seek food at pasture, and consequent loss of condition.

Grazing over contaminated pastures or eating contaminated fodder causes ulceration of the mouth, stomach, and intestines. In mild cases the animal salivates freely when the ulceration is established and is unwilling to feed. In severe cases there is abdominal pain (colic) and diarrhoea; the excreta being offensive and blood stained.

In the larger animals the skin is comparatively resistant to mustard gas vapour, but, injury may be sustained if the concentration is high and/or the exposure prolonged, particularly where the skin is fine between the legs. *The risk is greater when the animals are sweating.* Injury to the skin by vapour is caused when the liquid gas falls upon the harness or clothing. These injuries resemble those caused by direct liquid contamination except that they are milder in character and healing takes place in a shorter time.

When exposed to mustard vapour the eyelids swell, tears run down the face and later a thick discharge issues from between the lids.

Inhalation of the vapour causes ulceration of the lining membrane of the nose and windpipe. A thick nasal discharge develops and this may be streaked with blood. A sudden rise in temperature may indicate the onset of complications (pneumonia).

Treatment

A very slow rate of healing is characteristic of mustard gas injuries and first aid treatment should be employed to shorten the healing time. The success of such early treatment depends upon the speed with which it is used after exposure; the best method being that which can be most easily applied. Unless it is employed within *ten minutes* after contamination by the liquid, injury will follow. The longer the treatment is delayed, the worse will be the injury but some mitigation may be expected even when the delay amounts to hours.

When contaminated animals have to be treated the attendants must, for their own safety, wear respirators and protective clothing. In the case of transport animals the attendants should:—

(*a*) Remove saddlery and harness, which will be regarded as contaminated.

(*b*) Secure the tail by holding or tying. Before doing so dust with bleaching powder, *bleach or sand mixture,* or soak with bleach solution, Eusol or solution of sodium hypochlorite (Milton, Chloros, Voxsan, etc.) if available.

The animal should be treated as follows:—

(1) *Where the contamination is widespread and cannot be accurately defined.*

Scrub the animal all over vigorously with soap and water. Warm water, soda and soft soap will be most convenient. Use plenty of water and continue washing for 20 minutes; or

Brush into the skin a paste made of equal parts of bleaching powder and water, care being taken to avoid the eyes, nostrils and lips. Bleach paste is irritant and should not be left on the skin longer than five minutes; it is removed by flushing with water; or

Soak with Eusol or solution of sodium hypochlorite; or

Hose down with water for half an hour.

(*Note.*—Bleach paste* should preferably be freshly prepared for use as it tends to solidify after some hours and has to be further diluted with water to render it fit for use. The weaker solution is less irritant to the skin and so may be applied for a slightly longer period. If it is necessary to store bleach paste for short periods it should be kept in enamelled iron buckets.)

*A non-hydroscopic bleach is now obtainable.

(2) *Where the contamination is local and clearly defined.*

If the drops are visible they should be removed by cotton wool, cotton waste or rags, care being taken not to spread the contamination to the surrounding parts. The cotton wool or waste is promptly burned or buried. Affected areas are then treated with bleach paste by washing, or by applying anti-gas ointment. Anti-gas ointment is itself irritant and must be removed as soon as opportunity offers. The bulk should be scraped out of the coat and the remainder removed by petrol. It is on account of this difficulty in removing anti-gas ointment from the coat that watery bleach paste is a more convenient method for animals. Swabbing well with Eusol or a solution of sodium hypochlorite is also a method of decontamination. In certain circumstances it may be convenient to swab off the gas by solvents such as paraffin or petrol. It must be realised that the gas is not destroyed by this method but is simply diluted. Care should be taken, therefore, not to spread the contamination to the surrounding parts when swabbing with solvents.

Eyes should be treated in the following manner:—

Wash out freely with plenty of plain warm water or with a solution of bicarbonate of soda or common salt (one teaspoonful to the pint). Continue to irrigate for ten minutes. Then put a little cod liver, castor or medicinal paraffin oil into the eye.

Lungs.—When the lungs are affected rest and good nursing are essential. The animal should have plenty of clean drinking water and plenty of fresh air. Rugs and bandages should be used to maintain body warmth.

Skin.—If the coat of the animal is dirty with an accumulation of grease and dandruff, the lesions may be more severe than those resulting from contamination of a clipped animal. The full coat affords good protection against mustard gas vapour.

Lewisite.—Lewisite acts similarly to mustard gas except that it is more irritant and may cause general poisoning by the absorption of arsenic. First aid treatment consists of well washing with hot water, soda or soap or water alone, but it should be carried out within 20 minutes after contamination. Eyes should be treated as advised for mustard gas.

ANIMALS IN CHEMICAL WARFARE

War Gases and their action on Animals

Group.	Example.	Properties, Chemical and Physical.	Method of Recognition.	Persistency.	Action on Animals.	First-Aid Treatment.	Protection.
Blister	Mustard Gas or Yperite	An oily liquid which may vary in colour from dark brown to straw yellow. Soluble in oil and spirits. *Neutralised by bleaching powder (chloride of lime). Great power of penetration. Will penetrate horse rug in 10 minutes, waterproof clothing in 1½ hours and heavy oilskins in 5 hours. Remains active at low temperature over long periods. High temperatures decompose it. *Boiling in water destroys. Decomposed in presence of oxidising agents such as peroxides, potassium permanganate and bleaching powder.	Smell of garlic, onions, horse radish or mustard. Liquid may be seen. A.R.P. services employ special chemical detectors.	Very persistent	All animals suffer.† Birds are particularly susceptible. (*a*) *Skin.*—Skin of larger animals comparatively resistant. Fine skin between legs and over udder of cows most susceptible to injury. Sweating increases risk. Swelling marks affected areas; this subsides, leaving wrinkled area of dead skin which finally separates and leaves ulcerous sore. Light contamination, damage is superficial. Heavy contamination, deep seated ulceration. (*b*) *Legs.*—Fine skin of heels and between claws, particularly prone to injury. Horn of hooves sufficiently resistant to protect sensitive structures of foot. (*c*) *Eyes.*—Smallest drop causes serious injury. Heavy contamination may lead to permanent blindness. (*d*) *Respiratory Tract.*—Inhalation of vapour causes ulceration of lining membrane of nose and windpipe. Pneumonia may supervene. (*e*) *Digestive Tract.*—Feeding on contaminated pastureland or fodder causes ulceration of mouth, stomach and intestines. †Much suffering and the risk of spreading contamination avoided if animals badly infected are humanely destroyed without delay.	Attendants must wear respirators and protective clothing. Success of treatment depends upon speed with which it is applied. To avert grave injury, treatment must be applied within 10 minutes of contamination. Remove saddlery and harness. If contamination local and areas clearly defined smear over with "bleach" paste.‡ If contamination widespread, scrub animal's entire body vigorously with plentiful supply of warm water, soda and soft soap. Brush "bleach" paste into skin, avoiding eyes, nostrils and lips. Remove paste by flushing with water and hosing down for 30 minutes. Freely irrigate eyes with solution of bicarbonate of soda or common salt (1 teaspoonful to a pint of water). Rest and good nursing are essential. Plenty of fresh air, maintenance of body warmth, sponge nostrils with solution of boracic acid, give liberal diet. Soft feed such as bran, boiled grain, carrots or linseed gruel. Small animals should be placed on a sloppy diet. ‡Bleach paste is made by using: Chloride of lime, 1 part; Water, 1 or 2 parts. It should be *freshly* prepared and further diluted with water if tending to solidify. The weaker dilution, *i.e.*, 1 of bleach to 2 parts water is less irritant to the skin and can be applied over slightly longer periods.	*Urban Areas.* No satisfactory animal gas mask has yet been produced. Stables, byres and kennels—especially if of modern construction—can be made gas proof with blankets over doorway and windows and filling up of cracks and holes with putty, mud or strong paper. Ventilators and other spaces can be blocked with wet hay, newspaper, cotton waste or rags and rendered even more effective, if small quantities of bleaching powder—non-hydroscopic—are sprinkled over materials used. The provision for ventilation in stable or cowshed need not enter into the calculations as the large domestic animals—especially the horse—can tolerate a high degree of heat and humidity. Household animals could be taken into refuge room. Dogs, however, must be effectively muzzled. If gas-proof boxes are used make sure that supply of filtered air is provided by effective mechanical means. Unventilated boxes cause distress. Birds, domestic pets and small animals should be kept housed if possible. Cover cages with blanket or sacking soaked in bicarbonate of soda solution. Cover food and forage supplies, store in metal bins. Use running water for watering animals. *Rural Areas.* Animals in the open and grazing over high ground where good and constant breeze is blowing are comparatively safe. Avoid valleys and any pastureland suspected of being contaminated. For gas proofing of stables, byres, piggeries and poultry houses employ similar measures as stated above, modifying them according to circumstances.

ANIMALS IN CHEMICAL WARFARE—*Continued.*

Group.	Example.	Properties, Chemical and Physical.	Method of Recognition.	Persistency.	Action on Animals.	First-Aid Treatment.	Protection.
Blister	Lewisite	In the pure state is a colourless liquid, but when crude is dark brown; gives off an invisible gas. Is rapidly destroyed by contact with water at any temperature and by a solution of washing soda. Penetrates materials. Has very low freezing point.	Strong odour of geraniums.	Persistent but less so than mustard.	Affects all animals. Lewisite injuries resemble those caused by mustard gas; there is more irritation and there may be symptoms of general poisoning by the absorption of arsenic. (1) Liquid Form. (*a*) *Skin.* — Severe and immediate irritation. (*b*) *Eyes.*—Immediate effect: profuse lachrymation, may result in permanent injury. (2) Vapour. Detected by smell of geraniums. Severe irritation of nasal mucous membrane.	Washing with soap and water or water alone, but must be carried out within 20 minutes after contamination.	Protective measures along similar lines to those adopted against mustard gas.
Choking	Phosgene	A gas — almost invisible. Corrodes metals. Readily dissociates in a watery medium. Is rendered less effec- by heavy rain.	Smell of musty hay.	Non-persistent.	Action is delayed and no symptoms may be observed until some hours after exposure. Phosgene is a powerful lung irritant. *Mild Cases.*—General appearance of depression; eyes staring, nostrils dilated, hurried breathing, slight rise in temperature. Recovery may be expected in from 4 to 6 days. *Acute Cases.*—Hurried and difficult breathing, nostrils widely dilated, nasal discharge, at first foaming, but later thick and blood stained. Oedema of lung and death may occur by the forty-eighth hour.	Attendants wear respirators which afford complete protection. Remove animal from dangerous atmosphere. To prevent the breathing of more gas during removal put on nosebags lined with damp hay. Harness and saddlery should be removed and the animal moved *slowly* to a place of safety. Excessive movement will aggravate the condition and may lead to its death. If ambulance available use it. Keep animal in the open and maintain body warmth with blanket and bandages. Regard all cases as serious. Convalescence is slow and recovered cases should be brought gradually and carefully into work. Small Animals. Remove from danger zone. Protect head by covering entire animal in blanket. Allow plenty of fresh air but keep animals confined to prevent undue exertion. Warm clothing and good nursing are essential.	Adopt protective measures as for mustard gas.
Choking	Chlorine	A gas — greenish colour. Corrodes metals. Is dissolved in water	Smell like bleaching powder (chloride of lime).	Non-persistent.	Similar to phosgene but not so deadly.	Respirators must be worn by attendants. Treatment as for phosgene.	As for mustard gas.

ANIMALS IN CHEMICAL WARFARE—*Continued.*

Group.	Example.	Properties, Chemical and Physical.	Method of Recognition.	Persistency.	Action on Animals.	First-Aid Treatment.	Protection.
Continued Nose	D.M. D.A. D.C.	Arsenical smokes, odourless and generally invisible.	By causing sneezing and watery discharges from eyes.	Non-persistent.	In high concentrations animals behave quietly and apart from some sneezing and a watery discharge from the nose, no ill-effects follow exposure. Horses can be worked immediately after exposure. *N.B.*—Nose gases cause acute physical distress in man.	Unnecessary as nose gases have only a transient effect on animals.	
Tear	C.A.P. K.S.K. B.B.C.	All invisible in gaseous state.	C.A P. irritates eyes and nose. K.S.K. has smell of pear drops. B.B.C. has a pungent odour.	Non-persistent. Persistent (Hours) Persistent (Days)	Tear gases have no effect on animals.		

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The Horse in relation to Air Raid Precautions*

1. *Halter or head collars and rope.*

Each man in charge of a horse should be provided with a means of tying his horse night or day by either a strong head halter or strong head collar and rope, the rope to be not less than six to twelve feet in length, according to the size of the horse. The authorities should be given power to inspect horses on the streets to ensure that halters or head collars are provided and that they are efficient.

2. *Hobbling and/or Blindfolding.*

The question of hobbling and/or blindfolding should be left to the discretion of owners and drivers, it being felt that such methods should be permissive and not necessarily be recommended in every case.

3. *Removal of animals from vehicles.*

(*a*) When an alarm is sounded or a raid takes place, vehicles should be driven into side streets in order to keep the main roads clear.

(*b*) The animals should be removed from vehicles.

(*c*) Stables may not afford protection for horses unless they are specially constructed, but they may prevent wounds due to falling shell fragments and they will protect the public from the danger caused by frightened animals. If drivers know of stables in the neighbourhood, they should drive there direct; on no account, however, should time be wasted in searching for stables. In the absence of suitable accommodation they should drive their animals into side streets.

(*d*) The handbrake should be applied full on and the wheel chained.

(*e*) Nosebag should be attached (to quieten the horse). The bit should not be removed.

(*f*) Horse should be unhitched and walked to rear of vehicle. (Shafts to be left on ground.)

(*g*) The horse should be securely tethered by rope to iron bar of tailboard at rear of vehicle, or to the rear wheel, the animal being allowed only as much rope as is necessary to allow its head to reach the ground.

4. *Provision of facilities in public parks, recreation grounds.*

Facilities should be provided in public parks and other similar places, by means of rings in walls, bandstands, etc., or picket lines, for the temporary accommodation of horses.

5. *Horse ambulances.*

A record should be obtained of horse and cattle conveyances throughout the country, with a view to their use being procured.

6. *Use of slip hook and ring in stables.*

As a quick release in the case of fire and other emergencies slip hooks with rings should be used on head stall ropes in stables.

7. *Knee-caps.*

Horse-owners are recommended to furnish their animals with knee-caps.

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Don'ts

Don't risk working a horse on the streets that is known to be nervous or fractious.

Don't tie your horse to a lamppost, Belisha beacons or railings unless no other course is open to you.

Don't tie your horse by the reins. These will snap in an emergency and the average lamppost can very easily be pulled over with consequent danger of escaping gas.

*Recommendations made at the conference of horse-owners held in London in May last.

Notes and News

Diary of Events

Sept. 11th.—Meeting of the Editorial Committee, N.V.M.A., at 36, Gordon Square, W.C.1, 4 p.m.

Sept. 20th.—Applications due for Miss Aleen Cust Veterinary Research Scholarship.

Oct. 4th.—R.C.V.S. Committee Meetings.

Oct. 5th.—R.C.V.S. Committee Meetings.

Oct. 6th.—R.C.V.S. Committee Meetings and **Council Meetings.**

Nov. 1st.—All changes of address to be reported to Registrar, R.C.V.S.

Nov. 6th.—Provisional commencing date of Animal Management Examination.

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ANIMALS IN AIR RAIDS

N.V.M.A. Pamphlet

In connection with the material relative to the protection of animals in air raids, with special reference to chemical warfare, published in this issue of the *Veterinary Record* and that of last week, a pamphlet is being prepared embodying the following features amongst others:—

(1) Air Raid Protective Devices for Animals.
(2) The Effects of War Gases on Animals.
(3) Tabular Statement of information contained in (2), amplified by additional data relative to detection, treatment, etc., suitable for mounting on board for display in surgery.
(4) "The Horse in relation to Air Raid Precautions."

The pamphlet will be available within a few days on application to the National Veterinary Medical Association, 36, Gordon Square, W.C.1, for a few pence.

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NATIONAL A.R.P. ANIMALS COMMITTEE

Colonel Robert J. Stordy, Chief Executive Officer, National A.R.P. Animals Committee, wishes to thank the numerous veterinary surgeons who have been good enough to reply to his letter of August 25th, inviting participation in the emergency scheme for the care of animals. Their prompt response to this appeal for co-operation is greatly appreciated, and Colonel Stordy regrets that, in the stress of work, he finds it impossible to communicate personally with these members of the profession.

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Emergency A.R.P. for Animals

In view of the rapidity with which the National Air Raid Precautions Animals Committee has had to develop an emergency organisation of A.R.P. for Animals, it has been impossible to notify every veterinary surgeon in evacuable areas as to whom the responsibility for co-ordinating the facilities of the profession and the animal welfare societies has been entrusted. We are therefore publishing the following list, for information:—

List of Veterinary Surgeons who have been invited to act as Regional Organisers, showing the areas which it is proposed shall come under their supervision.

W. S. King, M.R.C.V.S., 264, Burdett Road, Limehouse, E.14.
Telephone—East 3466.
Area—Bethnal Green, Poplar, Stepney, City East.

T. F. Prime, M.R.C.V.S., 21, Westow Hill, Upper Norwood, S.E.19.
Telephone—Gipsy Hill 0534.
Area—Kennington, Tower Bridge, Rotherhithe, Streatham, Brixton, Catford, Penge, Elmers End, Sydenham, Anerley, Norwood.

T. L. Wright, M.R.C.V.S., 183, Upper Richmond Road, Putney, S.W.15.
Telephone—Putney 0510.
Area—Wandsworth, Barnes, Richmond, Twickenham.

G. Sutton, F.R.C.V.S., 165, Church Street, Kensington, W.8.
Telephone—Park 4407.
Area—Chelsea, Fulham, Kensington, Hammersmith.

F. G. Buxton, M.R.C.V.S., 15, Jackson's Lane, Highgate, N.6.
Telephone—Mountview 1555.
Area—Islington, Hackney, Stoke Newington, Hornsey, Finchley.

Hamilton Kirk, M.R.C.V.S., "Croyland," 658, Finchley Road, N.W.11.
Telephone—Speedwell 7777.
Area—Hampstead, Golders Green, Hendon, Edgware.

John Willett, M.V.O., M.R.C.V.S., 1, Marylebone Road, N.W.1.
Telephone—Welbeck 1767.
Area—Paddington, Marylebone, St. Pancras.

F. E. Somer, F.R.C.V.S., D.V.S.M., 14, Blyth Road, Bromley, Kent.
Telephone—Ravensbourne 2033.
Area—Greenwich, Woolwich, Deptford, Lee Green, Lewisham, Bromley, Beckenham.

Mrs. M. Sheppard, M.R.C.V.S., 117, Queensway, Bayswater, W.2.
Telephone—Bayswater 2040.
Area—Wembley, Willesden.

H. A. King, M.R.C.V.S., 14, College Road, Harrow.
Telephone—Harrow 1078.
Area—Harrow, Cricklewood.

C. E. Woodrow, M.R.C.V.S., 12, Chiswick Lane, Chiswick, W.4.
Telephone—Acorn 2075.
Area—Acton, Ealing, Chiswick, Brentford, Hanwell.

E. Middleton Perry, C.B.E., T.D., M.R.C.V.S., 41, High Street, Wimbledon, S.W.10.
Telephone—Wimbledon 4228.
Area—Wimbledon, Mitcham.

J. C. Rix, M.R.C.V.S., 17, Station Road, Sidcup.
Telephone—Bexley Heath 134.
Area—Dartford, Bexley Heath, Erith, Gravesend, Chislehurst, Sidcup.

R. Bennett, F.R.C.V.S., 48, Hornchurch Road, Romford.
Telephone—Romford 596.
Area—Romford, Dagenham, Hornchurch.

Lieut.-Colonel B. L. Lake, D.S.O., O.B.E., M.R.C.V.S., R.S.P.C.A., 105, Jermyn Street, S.W.1.
Telephone—Whitehall 7177.
Area—Westminster, Victoria, Battersea.

J. C. Young, M.R.C.V.S., 32, Kimberley Road, Chingford, E.4.
Telephone—Silverthorn 2407.
Area—Chingford.

B. O. E. Walpole, M.R.C.V.S., Claremont, Chase Side, Old Southgate, N.14.
Telephone—Barnet 3713.
Area—Southgate, Enfield.

J. S. Blair, M.R.C.V.S., 17, Bruce Grove, Tottenham, N.17.
Telephone—Tottenham 4728.
Area—Edmonton, Tottenham, Wood Green.

H. E. Bywater, M.R.C.V.S., Town Hall, West Ham, E.15.
Telephone—Maryland 3301.
Area—West Ham, East Ham, Wanstead, Woodford, Walthamstow, Leyton, Ilford, Barking.

List of Veterinary Surgeons who have been invited to act as Regional Organisers in provincial evacuable areas, showing the districts which it is proposed shall come under their supervision.

A. M. Wylie, M.R.C.V.S., The Dell, Grays, Essex.
Telephone—Tilbury 110.
Area—Thurrock (Grays).

R. A. Edwards, M.R.C.V.S., 99, High Street, Rochester.
Telephone—Chatham 3128.
Area—Chatham, Gillingham, Rochester.

G. N. Gould, M.R.C.V.S., 10, Landguard Road, Southampton.
Telephone—Southampton 3179/80.
Area—Southampton, Gosport, Portsmouth.

Brennan DeVine, M.C., F.R.C.V.S., D.V.S.M., 7, St. Martin's Lane, Birmingham, 5.
Telephone—Midland 0121/2.
Area—Birmingham.

H. Sumner, M.R.C.V.S., D.V.H., 15, Vauxhall Road, Liverpool.
Area Liverpool, Bootle, Birkenhead, Wallasey.

W. K. Johnstone, M.R.C.V.S., 2, Oak Avenue, Talbot Road, Old Trafford, Manchester.
Telephone—Trafford Park 1030.
Area—Manchester, Salford.

R. E. Hirtes, M.R.C.V.S., Vet. Dept., Corporation Abattoir, Sheffield, 2.
Telephone—Sheffield 24552.
Area—Sheffield.

A. H. Watson, M.R.C.V.S., 39, Lower Rushton Road, Thornbury, Bradford.
Telephone—Bradford 4116.
Area—Bradford.

A. J. McCormick, 213, Kirkstall Road, Leeds, 4.
Telephone—Leeds 21832. *Area*—Leeds.

H. Thornton, M.R.C.V.S., Town Hall, Newcastle-on-Tyne.
Area—Newcastle, Gateshead.

A. Gofton, F.R.C.V.S., Vet. Dept., Public Health Chambers, Johnston Terrace, Edinburgh, 9.
Telephone—Edinburgh 22073.
Area—Edinburgh, Rosyth.

S. G. Abbott, M.R.C.V.S., D.V.S.M., Chief Veterinary Inspector, Vet. Dept., 60, Melbourne Street, Glasgow. *Telephone*—Giffnock 1981.
Area—Glasgow, Clydebank.

Major A. Spreull, D.S.O., T.D., 78, Ward Road, Dundee, Forfar.
Telephone—Dundee 4937. *Area*—Dundee.

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PERSONAL

Professor J. D. Stewart's Impending Retirement

In the course of a report of a visit paid by the directors of the Pastoral Products Boards' Conference to the University of Sydney School of Veterinary Science, the *Country Life and Stock and Station Journal* (Sydney) makes reference to the pending retirement of Mr. James Douglas Stewart, B.V.Sc., F.R.C.V.S., Dean of the Faculty of Veterinary Science.

"The Directors" (says the journal), "obviously had one regret—that before the 1940 Conference, Professor Stewart will have retired as Dean of the Faculty of Veterinary Science, with which he has been so long associated and which he has placed on such a pinacle as to attract the admiration of the veterinary authorities in all parts of the world.

"The Professor himself made fleeting reference to his coming retirement, when welcoming the delegates to the University. He did so because he wanted to pay tribute to the generous, practical help given the Faculty by the P.P. Boards and their ratepayers. He recalled the fact that this assistance was first forthcoming at a time when it was vitally needed, and he expressed great pleasure in the fact that one of those stalwarts behind the movement that brought the P.P. Boards to the assistance of the Veterinary School was present—Mr. J. T. W. Scott.

"Professor Stewart said that he was thoroughly grateful to the Boards and the members of the Advisory Council especially for their consistent help and co-operation. He thanked Mr. Moulder (present chairman) for his special and successful efforts in getting the Government to make £15,000 available for additions at the Veterinary Science School. He added that he was sorry the building would not be constructed this year, but he hoped that it would be available for next year. He referred also to the fact that to-day there were 150 veterinary students at the University and that there was a wider and keener appreciation of veterinary science everywhere in Australia—not only in N.S. Wales, but other States as well.

"Mr. J. T. W. Scott moved the motion of thanks and spoke feelingly of the esteem in which Professor Stewart was held by stock-owners through the land.

"Mr. H. C. Moulder, M.L.C., supported Mr. Scott and assured Professor Stewart that his monumental work in veterinary science and the teaching of veterinarians was not only universally acknowledged, but appreciated. He hoped the Professor would come back to see the opening of the new additions to the School."

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Marriage.—Holroyd—Kaby.—On August 19th, at Witton Parish Church, Northwich, Harry, only son of Mr. and Mrs. J. Holroyd, Blackburn, to Phyllis, elder daughter of Mr. and Mrs. T. Kaby, of Wyndcliffe, Northwich.

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R.C.V.S. OBITUARY

Batt, Arthur Edwin Goldstone, 85, West Street, Ryde, I.O.W. Graduated London, December 15th, 1892. Died August 22nd, 1939.

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Barnes, William Gordon, M.C., Durban, Natal, South Africa. Major late R.A.V.C. (T.F.). Graduated Edinburgh, May 22nd, 1888. Died August 1st, 1939; aged 73 years.

Major W. G. Barnes, M.C., M.R.C.V.S.

In connection with the passing of Major Barnes, which we record with much regret, Major W. A. Dykins, who succeeded him as Director of the Durban Municipal Abattoir in 1932, writes: "The death occurred somewhat

unexpectedly on August 1st of Major W. G. Barnes, M.C., barely a week after the death of his son, Mr. Harry Barnes. It is believed that the shock of his son's death hastened his demise.

"Born in the Highlands of Scotland some 73 years ago, it can be said that the late Major Barnes was widely travelled and had had a varied career. At one time he was attached to the Indian Army, and saw service in the Anglo-Boer War with the Rough Riders, and during the Great War he was attached to the Lahore Division of the Indian Army. At the time he left South Africa to join up he was entrusted with the important work of carrying dispatches from General Botha to Lord Kitchener.

"Prior to his arrival in South Africa, the late Major Barnes held the appointment of Superintendent of the City of London Abattoirs and Cattle Markets at Islington, and many of the South African students no doubt will remember with gratitude the guidance and assistance so freely given by him, when attending at that abattoir for practical demonstrations. For his services in London he was made a Freeman of the City in 1910.

"It is rather noteworthy that every member of his family saw active service in the Great War, and one of his sons fell in action.

"The late Major Barnes was appointed Director of the Municipal Abattoir and Transport Department of the Durban City Council in 1913, and he served the Corporation faithfully and well. He had a very sound knowledge of all matters appertaining to abattoir control. Members of the profession in South Africa should be very grateful to him and other pioneers for the eminently satisfactory status which has been accorded to professional officers. It is as well to record points of this nature when we are living in an age when so much is taken for granted.

"The funeral took place at Stellawood Cemetery on August 2nd, and was conducted by the Rev. H. F. Yule, full military honours being accorded. A wreath was sent by His Worship the Mayor and Councillors of Durban, and the Council was represented by Councillor A. Youngleson and myself."

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THE INSTITUTE OF MEDICAL AND VETERINARY SCIENCE, ADELAIDE

Opening of New Laboratories

In reference to the above, the following is contributed by Sir Charles Martin, C.M.G., F.R.S., to the issue of *Nature* of August 26th:—

The new Institute of Medical and Veterinary Science was officially opened on May 24th by Sir George Murray, Lieutenant-Governor of South Australia and Chancellor of the University of Adelaide. It represents in part an extension and modification of the pre-existing facilities for the study of pathology, bacteriology and biochemistry at the Adelaide Hospital, which is the School of Medicine of the University; in part, it is a new development:—

(1) To carry out, with more adequate accommodation, equipment and staff than heretofore, the routine investigations in the subjects mentioned above for the Adelaide Hospital, Stock and Brands Department, country hospitals and private practitioners.

(2) To engage in research into the causation, diagnosis and cure of disease in man and animals.

(3) By bringing into a building devoted to these purposes the University teaching departments of pathology, bacteriology and applied physiology, as well as a properly equipped clinical lecture theatre previously wanting in Adelaide, to attempt to inculcate in the medical students that appreciation of the significance of laboratory medicine to which at present comparatively little attention is paid, and thus to render their later outlook more truly scientific.

The Institute will work in the closest collaboration with the Adelaide Hospital on one hand and with the University on the other, and adds greatly to the amenities of the Adelaide Medical School.

The Institute is the result of a joint effort on the part of the University and members of the staff of the Hospital to bring together in closer association the Department of Pathology of the University and the pathological services of the Hospital. As the two institutions adjoin there were no topographical reasons why this should not be brought about. The Institute is located in the grounds of the Hospital. It faces Frome Avenue, on the opposite side of which is the University campus. It extends backwards amidst the Hospital buildings, which are arranged on the pavilion system. It is, therefore, suitably placed for service to the Hospital and readily accessible to patients. It is also close to the other scientific institutes of the University and to the University library. The style is Georgian, with a pleasing simple frontage, and it has been judiciously planned so as to permit of future extension.

In 1936 the authorities were fortunate in securing Dr. E. Weston Hurst for its first director. Shortly afterwards, the University appointed Dr. Hurst to a research professorship which whilst it gives him the status of a senior officer in the University makes no demands upon the director for teaching duties.

Building was not commenced until 1937, so that the details of planning and equipment were able to be made under his supervision, and it is clear from the description of the arrangement of the Institute that they have been admirably conceived and carried out. Facilities for research have had due consideration.

The Institute has two stories with a half-basement. It contains some 20 laboratories, a library, two classrooms, a lecture theatre, a complete operating suite for animals, common rooms for staff and students, offices for the director, and an abundant supply of general service rooms (hot room, cold room, photographic suite, etc.), plenty of store rooms and a workshop.

On the first floor is a museum, 80 ft. × 40 ft., to house the collection of specimens of morbid anatomy hitherto inadequately accommodated at the University. Perhaps the most notable feature of the Institute is its fine animal house. This is situated 100 yards from the main building. Especial care has evidently been devoted to its construction and equipment for the breeding of experimental animals and the convenience and accuracy of experimental work. Expense has not been spared for this essential part of an institute for research in pathology, and it cost one-tenth as much as the main building.

The total cost has been £53,000. £15,000 was contributed by three notable benefactions, £10,000 by the commissioners of charitable funds and the rest by the Government of South Australia.

The Institute is governed by a council of six

representing the Adelaide Hospital, the University and the veterinary interests of the State.

The Adelaide Hospital being a Government institution, the surrender of a measure of its sovereignty and some of its territory required a special Act of Parliament. By this Act, the Government undertakes to contribute £10,000 a year towards the maintenance of the Institute, the remainder being derived from the University Chest and by the allocation of certain trust funds at the disposal of the University. As is usual, the provision of a sufficient revenue is left to luck. If the amount of research is to be enough to justify the accommodation, much more than is at present forthcoming will be required to provide modest salaries for the upkeep of research workers. There is no lack of suitable graduates in Australia who are anxious to devote themselves to investigation if they can see a reasonable prospect of a living wage. At present they come to Great Britain with Rhodes and Beit and other research studentships and when trained remain, as there are not openings for them in their mother country. This drainage is not too good for Australia.

Both University and Hospital are to be congratulated on having secured convenient modern accommodation and equipment for teaching and research in pathology and for the better treatment of patients and investigation of their diseases. They are still more to be congratulated on having surmounted the difficulties always attending combined action by the two corporate bodies under separate governance.

Close association of pathology with clinical medicine is desirable. A pathological institute can function apart from a hospital, but its scope is restricted, and researches tend to become remote from the immediate problems of human medicine and the workers lack the stimulus to effort which is afforded by contact with the sick.

An unusual feature in the new Institute at Adelaide is the inclusion of the study of animal pathology as one of its main objects. For some years investigations of diseases of farm animals have been carried on at the pathological laboratory at the Adelaide Hospital, the Government providing a veterinary officer and technical staff for the purpose. The continuation of this association of the study of human and animal diseases will be both convenient and advantageous, for pathology has no specific boundaries, and have not most of the recent discoveries in human pathology been, perforce, achieved by experimenting with animals?

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"DRASTIC REMEDIES"

"The strenuous years of the curriculum proper are only a small part of our medical training, which starts at school and goes on through life; but it is these years that have come in for most criticism," states the *Lancet*, in a leading article appearing under the above heading, in the issue of that journal of August 26th. "To read the medical journals one would think that they are organised very badly indeed; that is not so, but there are difficulties. One is that, with the passing of the apprenticeship system, the student does not come into contact with patients until late in his career; another is that, with the advance of science, the years are increasingly overcrowded. Of the first difficulty there is no efficient cure: the student must work out his own salvation. He cannot do it by playing golf or driving a motor car, for these occupations take him away from the people to whom he must give his life. Ninety per cent. of the population come within the income-limit of the national health insurance acts. These are the people he must know. He must walk through the countryside and come to the hospital in a bus. He may lunch off bread and cheese and beer at a country pub, or off coffee and poached eggs on the marble-topped tables of a teashop. He must go regularly to the pictures and study the development of Shirley Temple and learn to recognise the 'yee-a-ow' of Wendy Hiller when he hears it again at outpatients. He should listen to the variety on the wireless, and hear the full-throated roar that greets the quip which has missed the censor. Physiologists can teach him the theories of nutrition; housekeepers its practice. On Friday evening he should go shopping with his landlady or her daughter, to learn the price of bacon and which are the cheaper cuts, to know the countries that send us butter and how much we have to pay for a pound from each. Nor are these things all. Music to-day is a necessity, and he must continue to read good English, and especially poetry, not only, as Lord Horder has recently told us,[1] because the use of words is vital to the doctor but also that he may retain the flavour of a lovely language while he is studying from his text-books.

"But if we ask the student to find his own solution to one of his difficulties our responsibility is the greater to solve the other. Let us frankly admit that up to the present no way has been found. In 1931 a start was made by London University, and a conference of examining and teaching bodies was appointed. The conference began with the intention of lightening the curriculum, but in 1935 it produced a report of great ability which did nothing towards this, although it contained many valuable recommendations. The time has come when some of us are beginning to feel that much more is required than a rearrangement of detail which will hurt nobody's feelings. The ideal must be to look afresh at the objects to be attained and consider afresh the possible ways of reaching them. From university and medical school incessantly comes the news that students are being over-worked and under-educated. Radical reform is essential, and it is a healthy sign that drastic remedies are now beginning to be proposed. Last year, for example, Mr. T. B. Layton, addressing the Society of Apothecaries, threw a bombshell, as we then described it,[2] when he suggested that the way to solve the difficulty is to take obstetrics out of the curriculum. Recently he has returned to the subject[3] and expounded his views further. They are based on the fact that of those who qualify only a bare majority now go into general practice, so that the curriculum should no longer be constructed to turn out family doctors. Its aim should rather be to produce men and women who can branch out in any direction for which they have a natural bent or into which fate guides them. Even in general practice not all do obstetrics. Hence students are being burdened with facts that most of them will never need and cannot use in after life. Obstetrics, he argues, should therefore be transferred from the curriculum to the post-graduate period. His next step would be to interpolate

[1] *Lancet*. 1939. 1. 914.
[2] *Ibid*. 1938. 2. 1249.
[3] *Guy's Hosp. Gaz*. July 15th and Aug. 12th, 1939.

between qualification and independent practice a 'graduate' period of a year in which the newly sualified young doctor would, by law, be allowed to practise only under the guidance and supervision of a senior. There is nothing new in this last idea except the name; its germ is included in the report of the curriculum conference.

"The views put forward this week in Grains and Scruples by Doctor Don differ from those of Mr. Layton only as do the academic from the economic. Doctor Don suggests that the time is at hand when the student will be unable to earn his living before the age of 25. Mr. Layton proclaims that, whatever is done, there must be no further inroads on fathers' pockets. Doctor Don would disestablish pathology and fuse it to medicine; and would split up pharmacology between physiology and medicine. Mr. Layton would translate obstetrics to a higher plane. But if the curriculum is lightened in these or other ways we must be careful that it is not swamped by a number of other subjects simply because enormous advances are being made in them. The new knowledge must be absorbed into the existing divisions of the student's time, which must each drop something to make room for it. On this point Doctor Don writes wise words that should be taken to heart by clinicians and pathologists. His suggestions and those of Mr. Layton are drastic but they are both practical and practicable. Medical educationists will give them the consideration they deserve, for, to quote Doctor Don, 'Whatever our faults in medicine, we are at any rate conscious of many of them and anxious to improve.'"

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"THE BASIS OF LEADERSHIP"

In a leading article, headed as above, of its issue of last week, *Nature* quotes Sir Arthur Salter as maintaining that many of the dangers to which we are exposed at the present time are the result of defective leadership and not of inherent defects in our democratic institutions. "We cannot assume too readily with Professor Whitehead that the problem is not that of producing great men but of creating great societies, for the great society will put up the men for the occasion.

"The present testing time for democracy is forcing us to realise that the two problems are linked inseparably. The question of educating for democracy involves the problems of selection and training for the ever more arduous duties and responsibilities which the growing complexity of the modern State is forcing upon the administrator and statesman. If we have to consider education for citizenship in the sense that the efficient functioning of a democratic system depends upon an intelligent and educated electorate capable of taking independent and unprejudiced views, we have equally to consider it in the sense of providing training which will fit men and women for the many posts in local and central government which under a democracy demand wise judgment, respect for human personality, impartiality and a sense of justice and human values.

"The future of democracy may well depend on whether it can put up leaders of the requisite calibre alike in municipal or national affairs, free from Party prejudices and capable of taking long views and resolute action. We are being driven to consider again the Platonic view of education—whether, in fact, our system of education should not include some special provision and training for those destined to carry the responsibilities of leadership and administration. The question of a ruling class has once again to be faced fairly and dispassionately.

"This is the central problem which Mr. J. M. Murry has raised in a stimulating little book recently published,* and he insists on the necessity of a moral basis for leadership. It is indeed to the separation of religion from the social tradition of Christianity and the acceptance of the complete secularisation of society that he attributes a large measure of responsibility for the dangers and difficulties which confront us to-day. There is a striking parallel between the absorption of the Puritan in private religious observances and its consequences, and the absorption of scientific workers in their own special branch of knowledge and their neglect of, or indifference to, the social consequences of their work. Both alike impoverish and cramp man's capacities and experience. Mr. Murry makes a passionate attack on the departmentalisation of life from the religious side, an attack which should assist as much in bringing science and religion and ethics into that harmony so essential for man to regain his control over events as do the increasing efforts of leading men of science themselves to raise their fellows to a sense of their social and moral responsibilities, of which Sir William Bragg's Pilgrim Trust Lecture before the United States National Academy of Sciences provides a recent admirable illustration.

"Mr. Murry argues that, broadly speaking, there are two educational systems in Great Britain. The first includes the education of the elementary school, that of the secondary school and finally university education, mainly scientific or technical. The second system, which begins with the preparatory school, and is followed by the public school and then by the university, leads to positions which can only be adequately described as those of the ruling class. Roughly it is true that the ruling class in the main receives a type of education entirely different from that of the rest of the people, and whereas the first system is almost exclusively an intellectual system, in the second intellectual values are definitely subordinated to training in character.

"Mr. Murry considers that however lop-sided the public school system of values may be, it is much more realistic and effective than the system of values which prevails through elementary and secondary education, and that the insistence on its codes and traditions as more important than mere intellectual distinction makes for a real social coherence. He is accordingly concerned that we should attempt to preserve its virtues and to incorporate the public schools into the State system in a way that would render them no longer the preserve of the rich. He would achieve this either by bodily incorporating them into the State educational system and by drafting off to them boys who showed proof of a generalised rather than a specialised intelligence, or by founding at least two dozen State public schools which should take over the

**The Price of Leadership.* By John Middleton Murry. pp. 190. (London: Student Christian Movement Press, 1939.) 5s. net.

boy as completely as he is taken over by the existing public schools but should set themselves much more determinedly to discover the boy's real aptitudes.

"The fundamental premiss in Mr. Murry's argument is that we should recognise both the existence and necessity in a democracy of a ruling class, and concern ourselves with the education by which a ruling class is formed. The necessity for a class of men educated and trained for administration is widely recognised in industry to-day, where the future of large-scale industrial combines and of the public utility corporation may well depend upon its solution, and less widely in modern society generally. The idea is inherent in the many discussions which have taken place in the last 20 years regarding the place of the scientific or technical expert in administration, and in such reports as that of the Departmental Committee on the Qualifications, Recruitment, Training and Promotion of Local Government Officers.

"None the less, even those who are most alive to the social implications of the industrial combine or the public utility company are frequently blind to what is involved in the provision of leadership, and the reception given to the report on recruitment of local government officers indicates how far we yet are from appreciation of what is involved even in training for local administration.

"This position is doubly dangerous. It undermines the efficiency of democracy by making it more difficult to secure and operate the regional planning of services such as health, transport, water supply, etc., which are becoming more essential in the general interest and may be vital as defensive measures in war time. Moreover, it hinders the linking of social privilege and social responsibility which has been so marked a characteristic of the development of the democratic system in Great Britain, and is more than ever essential if respect for human personality is to be preserved in the face of totalitarianism.

"Mr. Murry indeed writes scathingly of many who profess to be leaders of democracy, and he demands clear and fundamental thinking on the two-party system and democracy as a whole to-day. What he is concerned to find is a system of education which will provide, not merely technically competent leaders, but also leaders who will safeguard for us the great values we have inherited. It is this view of life as a whole, in which moral and ethical no less than social, scientific, technical and artistic elements are respected and blended that leads him to place his main emphasis on the recognition by Christianity of its social relations and implications.

"Already in other countries a new ruling class is coming into being, and the need in Great Britain is immediate. The character of the State is determined by the conception of its social responsibilities held by the ruling class. It can select, and under totalitarian impulses it does select, the elements of man's lower nature for embodiment in the character and purpose of the whole social order. Under Christian impulses it can equally reconstruct the State to serve the highest ideals of which humanity is capable. The choice made by the ruling class is determined by the training given to the minds of its members in the schools.

"Mr. Murry asserts that the acceptance in Great Britain of State action solely as a channel of personal advantage without any philosophical or religious conception of the State as representative of the higher selves of man to whom duties are primarily owed, has left the moral initiative in Europe to the new totalitarian nations. The conception of the State as the instrument by which a democratic society is educated to the knowledge of its own nature and purpose is, however, a Christian conception, and Mr. Murry clinches his argument by contending that the religious basis of social life at which he aims can be realised in the schools, and was realised by Dr. Arnold and others. Moreover, when the new industrialists entered the ruling class, they found that individualistic morality was insufficient, and from their ranks came the leaders of a new movement towards a social religion able to meet Marxian materialists on their own ground.

"For Mr. Murry democracy cannot exist without Christianity. Unless democracy is constantly revivified by the regeneration of its individual members by Christian education, it must degenerate into totalitarianism. Either the individual must learn to conquer his lower self and attain his true personality as a citizen of a Christian society, or the democratic State, abandoned to be the instrument of the lower selves of its members, will enforce upon him a uniformity which is destructive of his whole personality. 'A modern industrial and democratic society by reason of its economic complexity, cannot suffer itself to become anarchical. If it is not permitted to develop creatively into a Christian society it must become a totalitarian tyranny.' Like Sir Cyril Norwood in his suggestive address last year on the relevance of Christianity in the modern world at the conference for young public schoolmasters, he claims that national education should be frankly based on Christianity conceived broadly in terms of the spiritual values of truth, beauty, and goodness—values which are increased by being shared.

"With very much in Mr. Murry's argument scientific workers will find themselves in real sympathy. They are profoundly concerned with all that makes for the maintenance of freedom of thought, of speech and of investigation and the preservation of spiritual values. Respect for human personality should be as cardinal a principle with them as loyalty to the truth and disinterested search for the facts. In their growing concern for the social consequences of their work they are conscious that, as Sir William Bragg pointed out, in his Pilgrim Trust Lecture, the spirit in which knowledge is sought and the manner in which it is used may be more important than knowledge itself. They themselves have to supply the natural knowledge for a solution of the problems of society, and help in its application. Their effectiveness depends equally, however, on their moral influence, on the devotion, wisdom and good will which they bring to their task. They may well be grateful to Mr. Murry for the clarity with which he displays the moral issues, for the force of his challenge to discard cant about democracy and to think out all that is involved in the training and selection of leaders for democracy not merely as we know it to-day, but as it might be in an ideal society. Nor should they forget that such fundamental thinking will point the way for them to make their own contribution to leadership and to secure the more effective utilisation in the service of the community of the knowledge already available and increasingly being placed at its disposal."